MAY 19, 1958

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

A PROGRAM FOR MANAGEMENT
1958 . . . No. 4

# Building a Labor Contract . . .

**Needed is more attention to work standards, seniority, other areas affecting pact's livability**
**—Page 125**

✔ **Brazing Alloys Tackle Heat Barrier . . . Page 140**

✔ **Titanium Begins a Comeback . . . Page 197**

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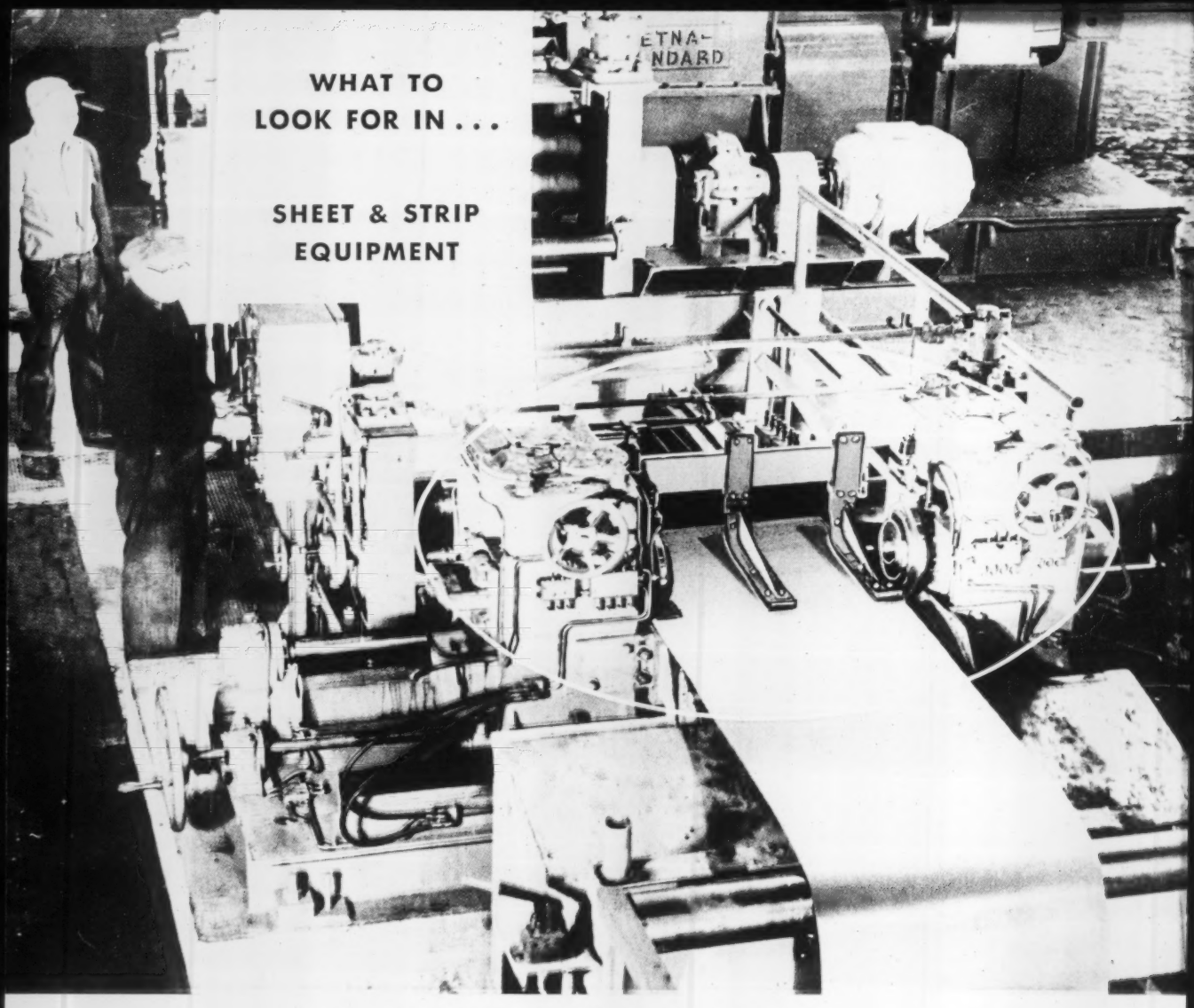


# WHAT TO LOOK FOR IN . . .

# SHEET & STRIP EQUIPMENT

## there's a DIFFERENCE in SLITTERS . . .

### *Easy Adjustment*

Each top spindle arranged for vertical adjustment.

Each spindle can be accurately set by screw adjustment for knife-side clearance.

Micrometer adjustment by worm and gear reduction in setting the vertical knife clearance.

Housings can be adjusted for various widths of strip.

Positive right-angle alignment of the rotary knives with strip.

Handwheel adjustment for upper chuck located where operator can see knife clearance.

### *Easy Operation*

All spindles driven by single helical gears of heat-treated alloy steel.

On many sizes, housings of high-speed tin-plate side trimmers tilted to assure side scrap removal from strip, preventing scrap cobbles.

### *Maintenance*

Bearings serviced by centralized lubrication.

Improved oil seal arrangement provided for trimmer housings.

### *Good Construction*

All internal parts housed in two cast-steel housings with oil seals to retain bearing lubricant.

Knives of high-carbon, high-chrome forged steel of double-edge reversible type.

Spindle housings and drive carried on heavy welded structural steel base.

Two-point support included for each upper chuck.

Mill-type shoe design assures proper alignment of housings for trimmer.

Four driven spindles of alloy steel forgings carried in two double rows of anti-friction bearings.

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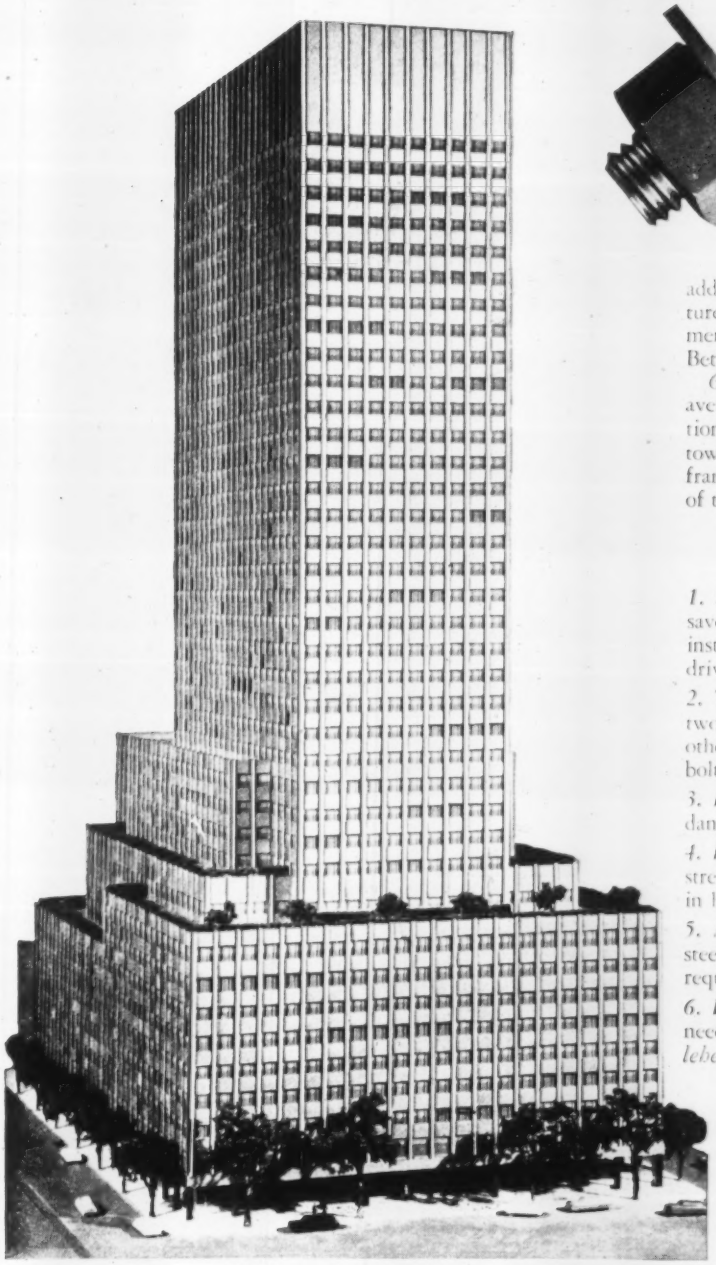
# Another New Skyscraper in New York with Bolted Steel Framework



Owner and builder: Tishman Realty & Construction Co., Inc.; Architect: Carson & Lundin; Structural engineer: Victor Mayper; Fabricator and erector: Bethlehem Steel Company.

This is 666 Fifth Avenue, an office building destined to be one of the better known addresses in New York City. The 39-story structure has a 13,300-ton steel framework, the structural members of which are joined with thousands of Bethlehem High-Strength Bolts.

666 Fifth Avenue occupies the west side of the avenue between 52nd and 53rd Sts. This air-conditioned structure has a 14-story base and a 25-story tower. White porcelain mullions, set in narrow frames of polished aluminum, extend the full height of the building exterior.

## Look at these advantages of Bethlehem High-Strength Bolts!

*1. Save time.* Bethlehem High-Strength Bolts save time in steel erection because they can be installed readily by ironworkers, using power-driven wrenches.

*2. Tight, sound joints.* The bolts are used with two hardened washers, one under the head, the other under the nut. When tightened carefully, the bolts produce high clamping power.

*3. Installed cold.* There's no chance of fire, no danger from tossed rivets which miss the target.

*4. Less noise.* Their use is relatively quiet. High-strength bolting is ideal for joining structural steel in hospital and school zones.

*5. Meet ASTM Spec. A-325.* Bolts are of carbon steel, and are quenched and tempered to meet the requirements of ASTM Specification A-325.

*6. Full size range.* They meet every construction need. *Full details can be obtained from the Bethlehem sales office nearest you.*

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributors:* Bethlehem Steel Export Corporation

**BETHLEHEM STEEL**

BETHLEHEM STEEL

Titanium's corrosion resistance and low heat conductivity team up to...

# DOUBLE SOLDERING PRODUCTION

**All-titanium** *dip soldering jig developed and used by Astatic Corporation has advantage of low heat conductivity and corrosion resistance.*

**Titanium** *jig has excellent wear resistance, permits holding close tolerances when soldering phonograph needle assembly.*

In handling a variety of soldering operations on small precision parts, Astatic Corporation—electronics manufacturer—has realized many benefits with Mallory-Sharon commercially pure titanium soldering fixtures:

- Corrosion resistance of the titanium fixtures to certain soldering fluxes is excellent. Thus service life is far longer than that of other metals previously used.
- Heat conductivity of titanium is low. Thus the fixture does not take heat away from the work, and the operation takes less time. On a typical assembly, use of the titanium fixture increased daily output from 1000 to 2500 parts per day.
- Titanium's excellent wear resistance, plus the fact that solder does not stick to titanium, allows very close tolerances to be maintained. Assembly rejects were cut from 25% to less than 1%.

Can *you* use titanium's unique advantages? For information on properties and fabrication techniques ask for the booklet "Titanium Fact File". Write Mallory-Sharon Metals Corporation, Niles, Ohio. Mallory-Sharon produces titanium, zirconium, and other special metals in sheet, strip, rod, bar, plate and other standard shapes to meet your requirements.

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METALS CORPORATION • NILES, OHIO

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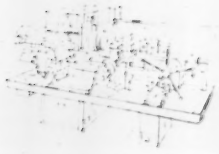
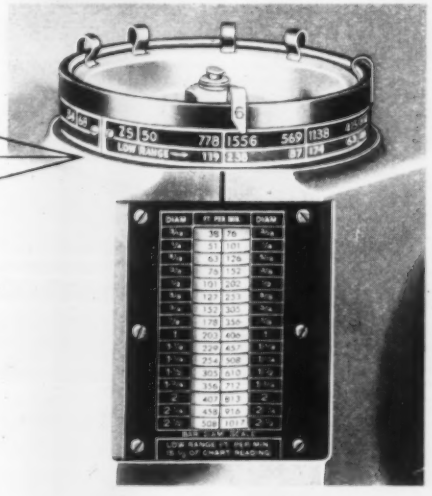


# If you

were a turret lathe operator today, wouldn't **you** want to work at a machine with this easy method of preselection?




Only Warner & Swasey offers this direct-reading speed selector calibrated in work diameter, surface feet, and spindle rpm's—thus, no slide rules or conversion charts are required to determine proper spindle speeds. Movable number clips indicate at a glance your job's sequence of speed changes.

**Ask your Warner & Swasey Field Engineer about this exclusive feature**

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PRECISION MACHINERY SINCE 1880

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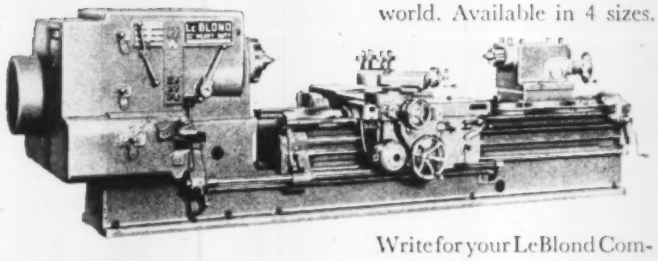

Write for your LeBlond Complete Line Catalog No. C-58.

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*World's Largest Builder of A Complete Line of Lathes for More Than 71 Years*

# This Week in STEEL The Metalworking Weekly

May 19, 1958
Vol. 142 No. 20

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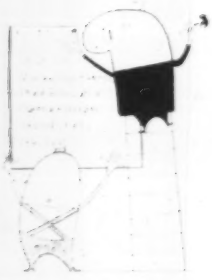

Building a Labor Contract—You'll be wise to do it in six areas that may prove troublesome for some time. No. 4 in 1958's Management Series.

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**MIRRORS OF MOTORDOM** 99

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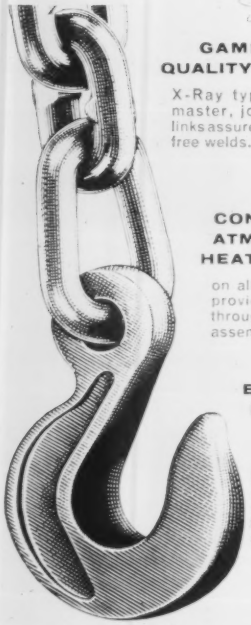

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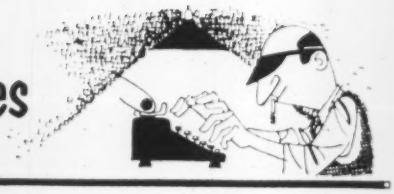
# behind the scenes



## Laboring Over Contracts

Henry Campbell Black, M.A., functioned at his peak during the declining years of the 19th century. By 1891 he completed his monumental law dictionary and sat back on his works, which included things like "Bankruptcy," "Mortgages," "Tax Titles," and "Intoxicating Liquors." You can see at a glance that his interests were almost universal. We introduce Mr. Black because the subject of labor contracts is about to appear in the next paragraph, and we want a reliable witness to shore up the basic importance of contracts.

STEEL's Program for Management article this week considers the construction of a labor contract. The story reveals the importance of minor issues, side issues, and the noneconomic aspects of the labor agreement. Dismal history hath shewn (with a bow to Mr. Black's shadowy progenitors) that ambiguous seniority provisions, transfer rights, or work standards can be more costly than higher wages or fringes because they lead to inefficiency or wildcat strikes. Essentially, the article is a plea to management to negotiate workable contracts.

Mr. Black begins his definition of contract on Page 421 of his dictionary and winds up near the bottom of Page 425, and to our way of thinking, that is a mighty comprehensive definition. Moreover, a word that rates that much scholarly and judicial attention shouldn't be treated lightly—and that's precisely what STEEL implies in its story, "Building a Labor Contract," Page 125.

Yes, we have progressed considerably. When the world was young and innocent, a man's word was contract enough for practically anybody, and some of the most stupendous agreements in government, finance, and trade were sealed with just a handshake. Now a simple agreement covering a coffee break may require three typewritten pages.

## Cover Goes into Reverse

This is the story of a STEEL cover—the Apr. 21 cover, to be exact. It illustrates the conflict between artists and industrialists, between poets and practical men. Dreamers seldom knock off earthly rewards. They spend most of their time trying to straighten out the mess the world is in; they write poetry and make sure that drapes harmonize with rugs; they patronize the opera and burn votive lights under pictures of Da Vinci, Walt Whitman, Florence Nightingale, Woodrow Wilson, and Eleanor Roosevelt.

Practical men, of course, see everything in proper perspective. They call their shots, don't put up with any nonsense, and make money. They subscribe heartily to the belief that Ezra Pound is, and always was, completely nuts; for good luck, they throw in Picasso, too, and we don't blame them.

The Apr. 21 cover on STEEL carried a photograph of a Howe & Fant Model A turret drilling machine, equipped with a $10\frac{1}{2}$ x 12 in. positioning table. A. S. Howe Jr., president of Howe & Fant Inc., East Norwalk, Conn., was justifiably pleased when STEEL ran a picture of one of his machines. His pleasure, however, reverted to shock when he saw the cover: His beautiful machine appeared as if in a mirror. It was reversed, or as Mr. Howe puts it: "A number of friends have called, asking if we have started building lefthanded machines for lefthanded foreigners."

We took up the matter with Artist Tom Welsh, the young man who designed the cover. "How come you flopped the picture?" we asked. For an artist, Tom had a perfectly logical answer. "It made a better design that way. My authority? Artistic license."

You see how it is, Mr. Howe?

## O. L. Y. Nott

A new scribbling game of sorts is going on in the building. The idea is to use authentic names fore or aft, with phonetic liberties, and make them match the occupation of the owner. For example, there is Lana DePhree and Homer D'Abreve, perennial flagwavers. Others are Rocco Phages, stonecutter; Carlo Dlotz, shipping clerk; Althea N. Church, choir director; Sharon Cheryl Eick, social worker; Reisen Schine, salesman; Holden Gray, Spanish War veteran. Well, maybe it's gimmicks like these that keep office workers from going 'round the bend.

## From the Rhind Papyrus

Senores W. H. Lake and J. P. Malin, industrial engineers, Marquardt Aircraft Co., Van Nuys, California, favored us with some gay and animated comments concerning the Vassar girl's tub of hooch. They demonstrated that their answer was right, and because we have been fooled by textbook answers before, we're going to string along with the engineers. Moreover, they were kind enough to send a teaser: "Problem 29 of the Rhind papyrus (c. 1650 BC) reads: A quantity and its two-thirds are added together, and one-third of the sum is added. Then one-third of the sum is taken, and the result is 10. What is the quantity?"

Shrdlu

(Metalworking Outlook—Page 79)

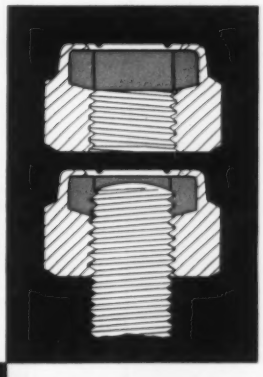
# What's special about this STOP NUT?

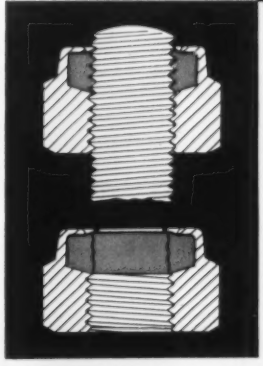
Several things make this nut unusual. For instance, you can "stop" it at any position on the threaded length of the bolt . . . or wrench it tight against the work where it protects bolt threads against corrosion and prevents liquid leakage. No matter where you leave it on the bolt, it will remain tight in that exact position, even though you subject it to heavy vibration and shock loads. But use a wrench on it and it comes off as easily as it went on. The red locking collar is nondestructive—does not gall bolt threads or remove plating. You can remove it and re-use it again and again.

## What gives it its grip?

**1** The locking collar is unthreaded and elastic. It has an inside diameter smaller than the major diameter of standard bolts.

**2** The bolt impresses a mating thread into the collar and the resulting compressive forces exert a constant friction grip on the bolt. . . .





**3** and exert a downward thrust bringing the lower flanks of the bolt thread into firm metal to metal contact with the matching nut threads, eliminating normal axial play.

**4** Nut is removable and reusable . . . the Red Elastic Collar retains its grip after repeated usage.

## Will it hold under ALL conditions?

The locking principle of the Elastic Stop® nut has been tested and proved by over 25 years of actual field service. Elastic Stop nuts are used on locomotives . . . and pile drivers. They fasten hedge shears and harvesters, drilling rigs and washing machines, trucks and roller skates. And no Elastic Stop nut customer has ever stopped using them because of unsatisfactory performance.

## What about sizes and materials?

Elastic Stop nuts are available from a watchmaker's 0-80 all the way to 4"—in materials that include stainless steel, brass, aluminum and other alloys. Protect your product with "fastener insurance." Try Elastic Stop nuts on trouble spots, whether to protect expensive heavy equipment from costly downtime or to guarantee the accuracy of delicate electrical equipment by maintaining precision adjustments. We'll supply free test samples.

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**ELASTIC STOP NUT CORPORATION OF AMERICA**

**Dept. N82-560, 2330 Vauxhall Road, Union, N. J.**

Please send the following free fastening information:

☐ ELASTIC STOP nut bulletin

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

## Missing Something ?

# Switch to PINK CIMCOOL

Yes, if you're missing that extra something in *your* shop, try CIMCOOL for metal cutting jobs. The famous CIMCOOL family of cutting fluids covers every job, every type of work and metal. Discover how the famous pink cutting fluid can lower costs and increase production in your plant.

Here are three reasons why CIMCOOL has become the largest selling chemical cutting fluid in the world:

**CIMCOOL LOWERS COSTS** because it's longer lasting in machines. Therefore, it reduces downtime and cuts labor costs for cleaning and changing.

**CIMCOOL PERMITS FASTER SPEEDS** and feeds, because of its chemical lubricity. It combines friction reduction and cooling capacity in a degree never before attained by old fashioned lubricants.

**CIMCOOL IS CLEANER TO USE** because it doesn't soil hands or clothing. It contains no skin irritants. And it's safer because it leaves no slippery film on shoes, floor, machine or work. It can't smoke, can't burn, and virtually eliminates rancidity and foul odors.

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Or contact us direct and we'll have one of our Cincinnati Milling trained machinists call on you—without cost or obligation, of course. Write, wire or telephone, Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

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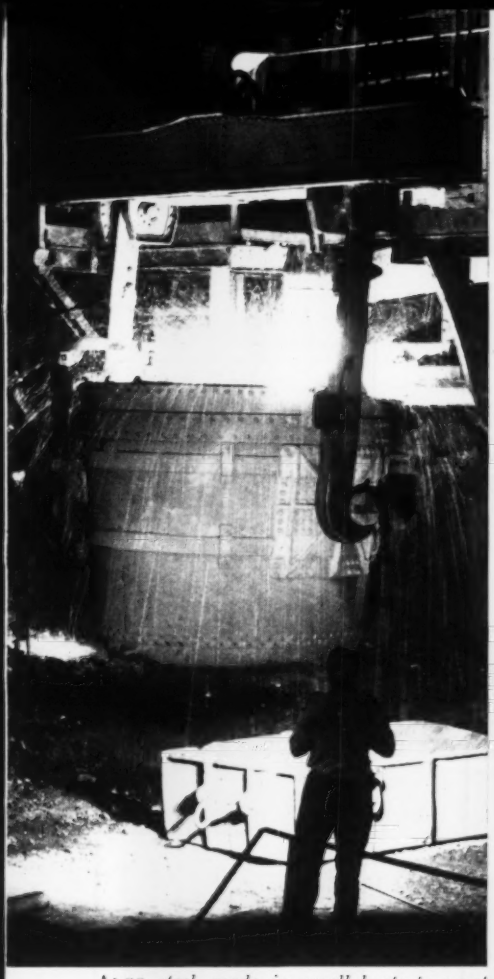

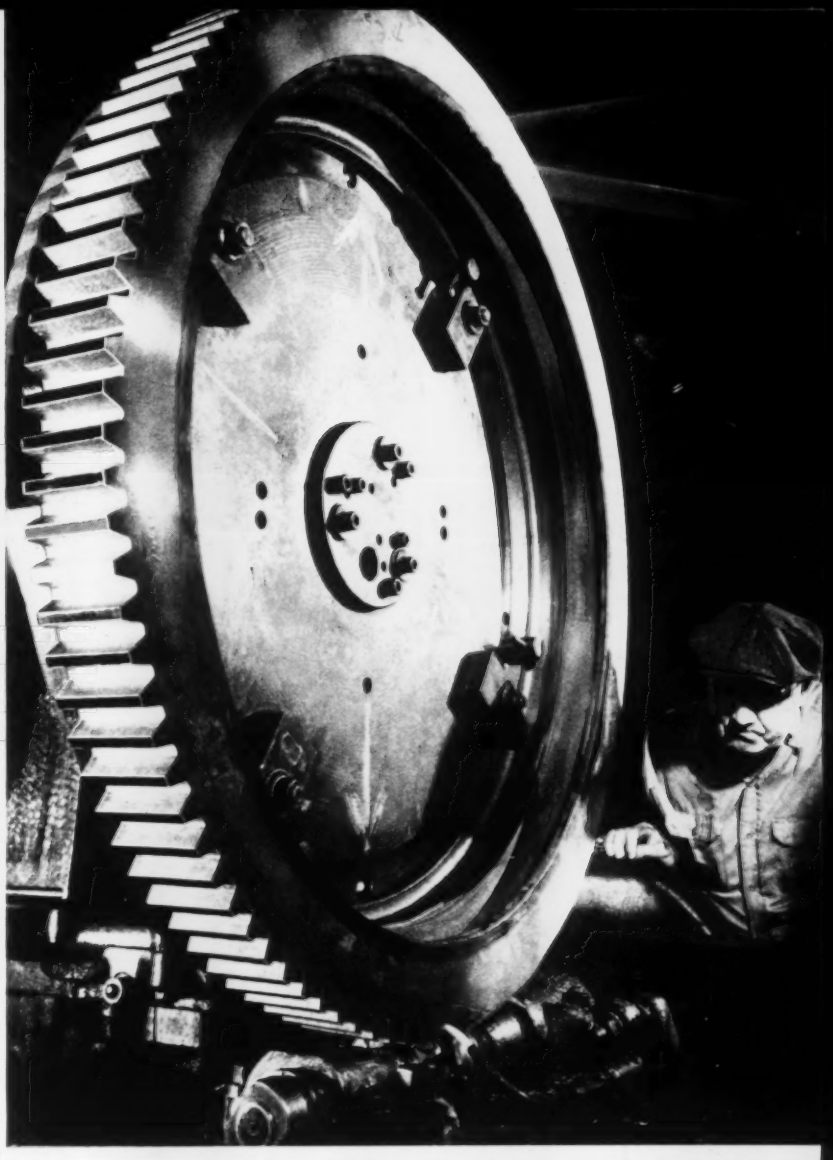

ALCO *steel, made in small heats to exact metallurgical specifications, is your assurance of high-quality forgings.*

ALCO's *regular forgings offer many opportunities for cost reduction in machine set-up and tooling.*

# HOW ALCO FORGINGS HELP LOWER COSTS

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In either regular or Hi-Qua-Led® grades in any AISI specification, or in stainless steel, ALCO circular and open-die forgings offer you unique advantages. They can lower your costs in machine set-up and tooling, because you are able to standardize procedures and set machining speeds for the best overall economy. Yet this extra opportunity for profit is obtained with no additional expense.

ALCO's forged and rolled circular forgings range from 18 to 145 in. OD; open-die forgings from 500 to 30,000 lb and 40 ft in length; mandrelled ring forgings to approximately 60 in. wide.

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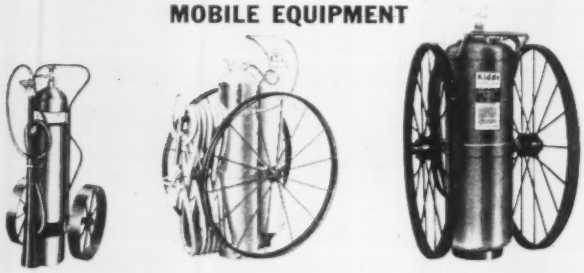
# GET THE JUMP ON FIRE
## with Kidde extinguishing equipment!

### PORTABLE EXTINGUISHERS

Left to right: carbon dioxide trigger, carbon dioxide squeeze valve, 2½ gallon foam, 2½ gallon pressurized water, 20-pound pressurized dry chemical, 20-pound cartridge-operated dry chemical, 2½ gallon pump tank, one quart pressurized vL. Also 1 gallon pressurized vL and 1 and 1½ quart pump vL.

Kidde hand portables are designed to knock fires out *fast*, come in a variety of types and models. The Kidde line includes carbon dioxide extinguishers with fast-acting trigger release or squeeze-valve release in capacities of 2½ to 20 pounds. Kidde dry chemical extinguishers can be had in pressurized models of 5, 10, 20 and 30 pounds capacity, and in cartridge-operated models of 20 and 30 pounds. Kidde wet chemical extinguishers (foam, soda-acid) are available in 2½ gallon bronze or stainless steel models, including cartridge-operated and pressurized water or water-anti-freeze units. Kidde vaporizing liquid extinguishers come in pump capacities of 1 and 1½ quarts, pressurized in 1 and 1½ quarts and 1 gallon. Kidde pump tank extinguishers, in steel or copper shells, are available in 2½ and 5-gallon sizes.

### MOBILE EQUIPMENT



Left to right: 100-lb. carbon dioxide, 150-lb. dry chemical, 40-gal. foam. Also 40-gal. soda-acid.

For major fire hazards, get a mobile unit. Wheeled carbon dioxide units are available in 50, 75, and 100-pound capacities, in one cylinder. Shut-off valve located at nozzle gives operator complete control. 150-pound dry chemical unit has straight stream for long range and fan pattern for wide coverage. Single-lever control for "on," "off," "fan," or "straight" discharge pattern. 50 feet of hose. 40-gallon wheeled foam unit delivers more than ten times its liquid content capacity in fire-smothering foam. Ideal protection against flammable liquid fires. All give expert results even with inexperienced operator.

### SMOKE AND FIRE DETECTORS, CARBON DIOXIDE SYSTEMS

Kidde Industrial Smoke Detectors give you a fire warning where it counts—at the smoldering start of a fire—tell you fire's location, give you a visible and audible alarm.

Kidde Atmo fire detecting and warning systems afford wide-area protection, are ideally suited for cases where early detection of fire in valuable materials is essential. Working on the principle of rate-of-temperature-rise, Kidde Atmo systems give warning at the first hot breath of fire, can be used to shut off fans, close doors, etc.—all automatically.

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# LETTERS
## TO THE EDITORS

### Management To See Report

We have just finished reading the article, "Machinery Rentals: New Lease on Life" (Apr. 14, Page 86). Could we have a copy? We would like to present it to our management. The articles in your Program for Management series are well appreciated because they are timely.

Harold E. Hollberg
Assistant Plant Manager
Magnus Chemical Co. Inc.
Garwood, N. J.

### Cure for Recession

We have read with great interest the article, "Let's Leap to Recovery with Bold Action on Depreciation" (Apr. 28, Page 55), and we feel that it contains considerable merit.

We would appreciate 12 reprints. We would like to forward this article with our comments to our senators and representatives and to several associates.

E. L. Ladd
President
United Aircraft Products Inc.
Dayton, Ohio

• • •

If you can spare ten copies, I would gladly send one with an accompanying letter to each of our congressmen and senators from Connecticut.

A. V. Bodine
President
Bodine Corp.
Bridgeport, Conn.

• • •

Please send me ten copies of this article immediately.

Roland Lehr
President
Baker Bros. Inc.
Toledo, Ohio

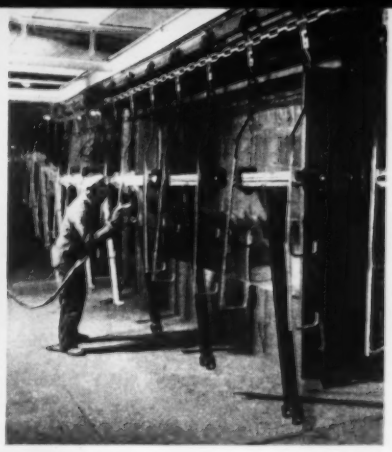
### Disagrees with Article

In the article, "Builders Hit Trade Squeeze" (Apr. 21, Page 57), was a report about testimony to the House Ways & Means Committee by J. Herbert Myers, director of overseas operations, Cincinnati Shaper Co. Fairness requires that the "opposite stand" be considered.

If the tariff on machine tools should be raised, all imports may not only be discouraged but may come to a standstill. Precision machine tools are one of the few commodities which can be sold here to earn badly needed U. S. dollars for European purchases of American goods.

It seems to be a question of whether

*(Please turn to Page 12)*



**At Eversman's plant,** *these tongue clevises produced from 3-inch Youngstown Standard Pipe, are being spray-painted prior to their assembly on finished scrapers.*

# Accent on Excellence

## Youngstown standard pipe

Lucky is today's farm operator that has a new Eversman hydraulically-controlled scraper to handle most of his land-farming jobs. By simply hitching to a tractor, he can easily prepare his land for increased per-acre income in the future.

In the manufacture of their scrapers, Eversman Manufacturing Co. of Denver, Colorado, relies on Youngstown's 3 to 6-inch Standard and Extra Heavy Black Pipe which provides the necessary strength and consistent high quality to meet the most rigid operating conditions encountered in the field.

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*Youngstown, Ohio*

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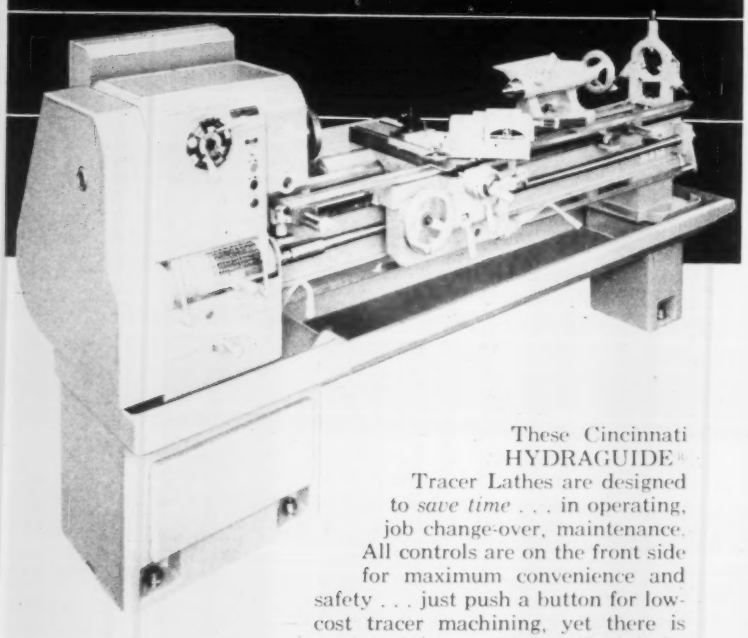

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*Do you have the new booklet, "How to Determine if a Lathe will be a Money-Maker"? See your CL&T Dealer, or write us direct.*

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# LETTERS

*(Concluded from Page 10)*

European machine tools are a threat to domestic manufacturers. Complicated and intricate foreign made machines with a high price tag are difficult to sell in the U. S. And the price gap between European and American machines of equal weight and quality in the medium and especially the higher price field tapers off.

The sales potential lies with lighter European machines (such as radial drills, shapers, and some grinding machines) which are bought frequently by smaller U. S. shops. These companies sometimes could not afford to buy a rather expensive domestic machine. So these sales are not lost by the domestic manufacturer, and the smaller companies are strengthened by getting modern equipment.

It is expected that European precision machine tools will become more expensive in the near future because of steadily rising labor costs. Needless to mention, it is more difficult and requires more money and effort to introduce, promote, and service unknown European equipment than a well established domestic brand.

It cannot be emphasized enough that if we isolate ourselves with a high wall of tariffs, European countries will be forced to seek the economic "friendship" of the communist sphere.

Carl W. A. Strohmeyer
Owner
Continental Industries
Milwaukee

## More on Nozzle Size

It was a pleasure to see my paper, "Effect of Nozzle Size on Pouring Rates and Slab Surface of Rimming Steels," reviewed in your article, "Nozzle Changes Pay Off" (Apr. 21, Page 144). However, the lower graph on Page 146 may have created a misleading impression.

The number of ingots (84) poured through the largest nozzle size (4 in.) was comparatively small and involved only one large mold size (30 x 62 in.). Hence, this sample is less reliable than those for the 2, 2½ and 3 in. nozzles. This nozzle was not tested extensively, and, as stated rightly in the review, it was decided that the 3 in. nozzle represents the optimum size for pouring pit operations.

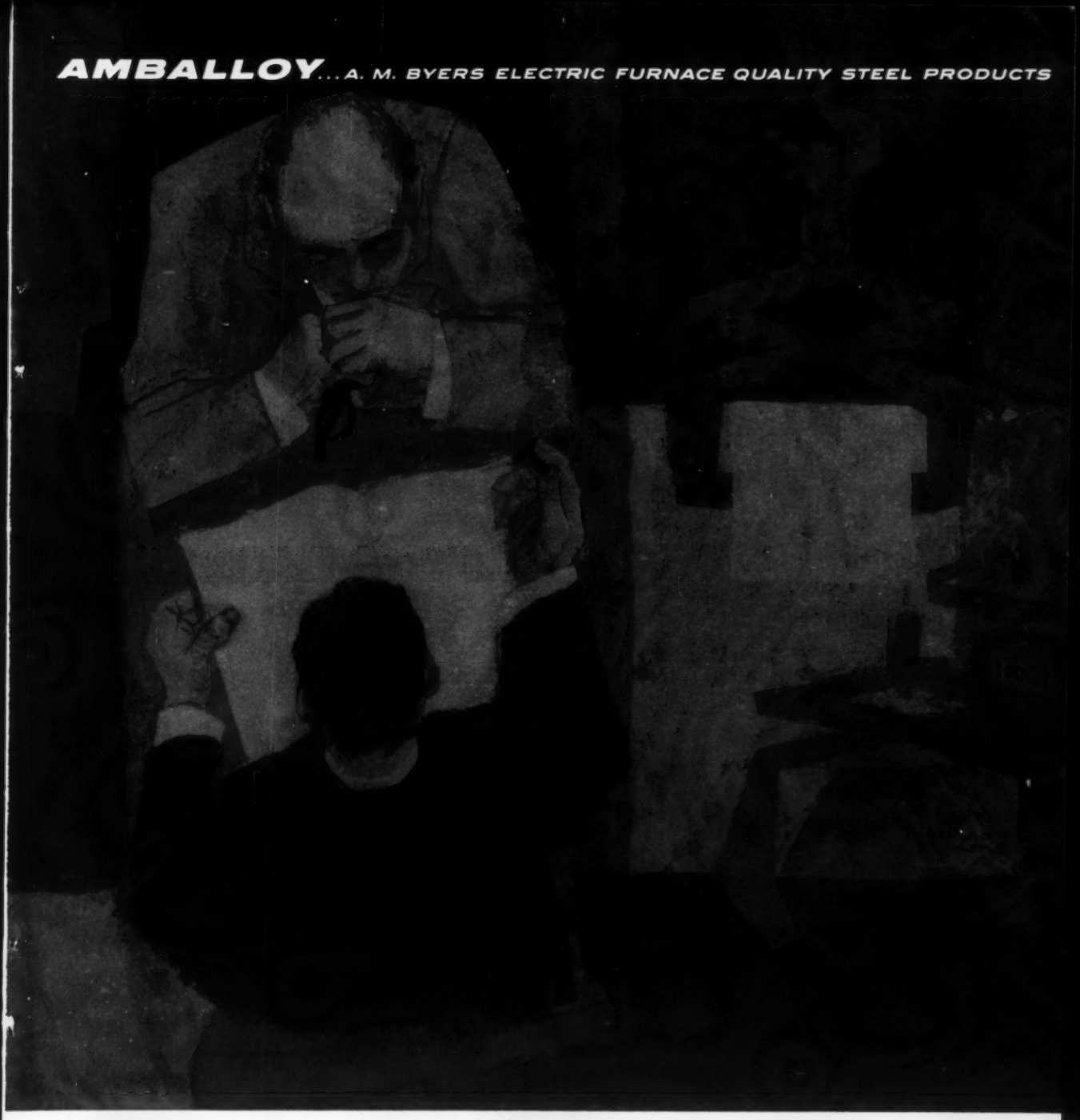
A. T. Peters
Metallurgist
Open Hearth & Blooming Mill Div.
Indiana Harbor Works
Inland Steel Co.
East Chicago, Ind.

## Guide Is Comprehensive

Your "Guide to Tool Steels & Carbides" insert in the Apr. 21 issue is comprehensive and well presented. I would appreciate five copies for use in our tool engineering and tool design departments.

F. F. Willis
Tooling Manager
Charlotte Div.
Douglas Aircraft Co. Inc.
Charlotte, N. C.

**AMBALLOY**... A. M. BYERS ELECTRIC FURNACE QUALITY STEEL PRODUCTS



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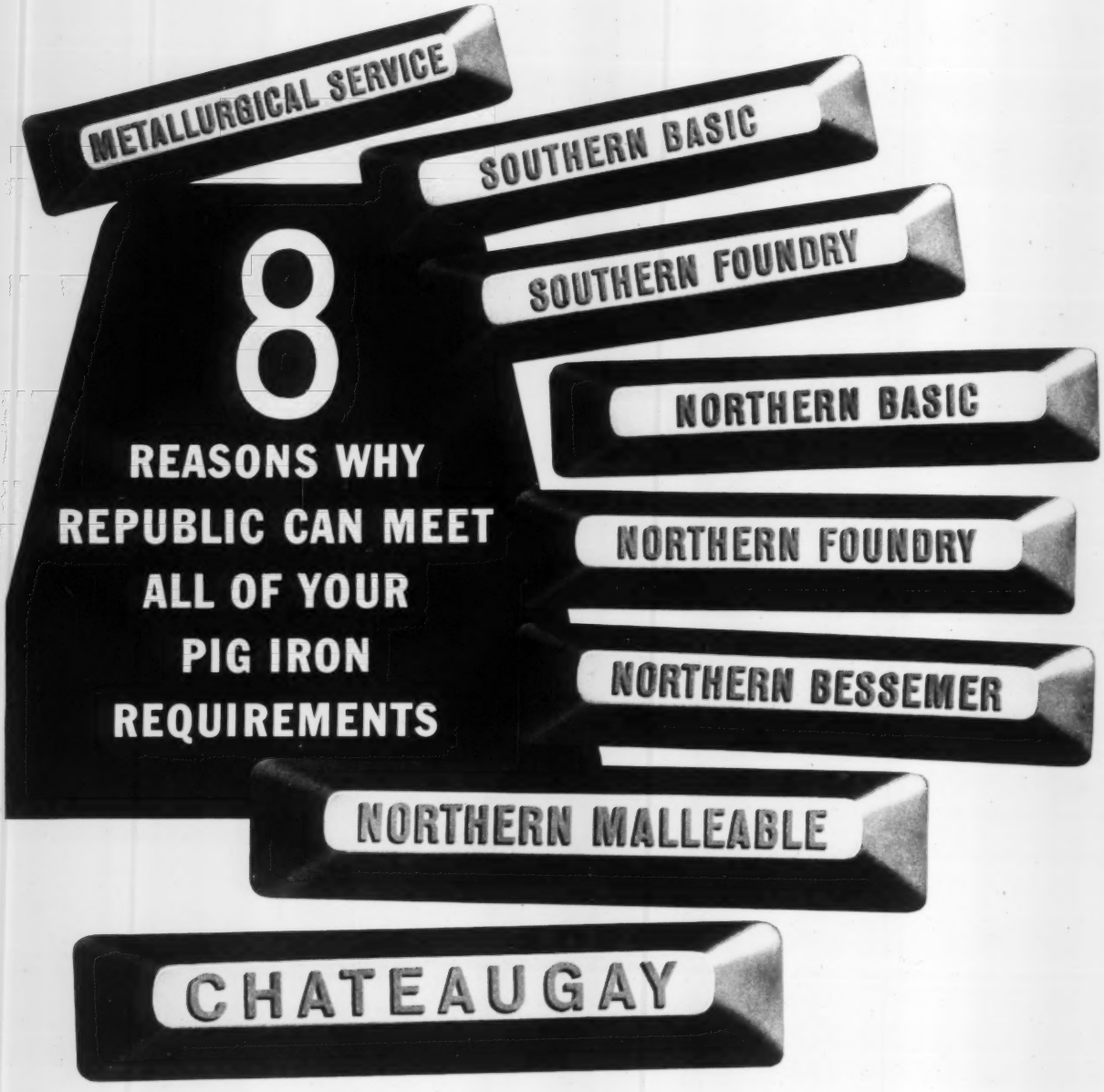


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Then, to assist you in selection, application, processing, and use, Republic provides expert metallurgical service. The Republic Pig Iron Metallurgists are both foundrymen and skilled technicians. They have a solid industry background gained from years of actual foundry experience. They know all types of irons and their characteristics. And, they talk a language you can understand—your language.

Republic Pig Iron Metallurgists have at their fingertips information on the latest processes and techniques available for improving castings, and expanding their use and sale.

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And, because Republic is the only producer of all grades of merchant pig iron, the metallurgists are able to recommend the proper grade for your specific job without hesitation or prejudice.

Seven grades of pig iron, plus prompt, expert metallurgical service add up to eight good reasons for relying upon Republic for all of your requirements. Mail the coupon for more information on Republic's complete line of irons, or for metallurgical service.

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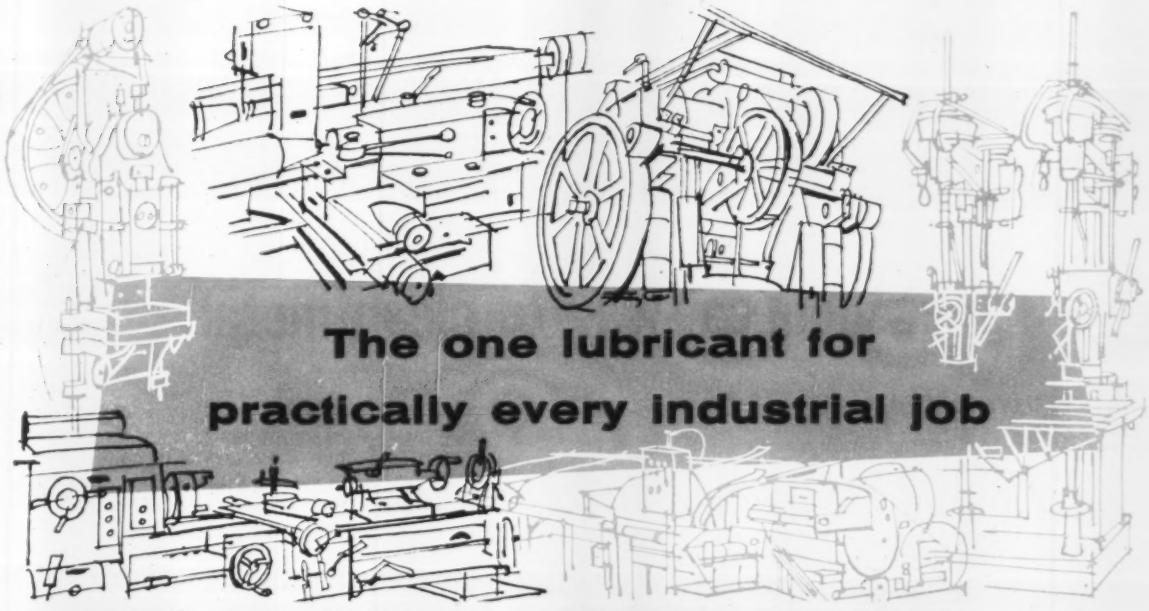

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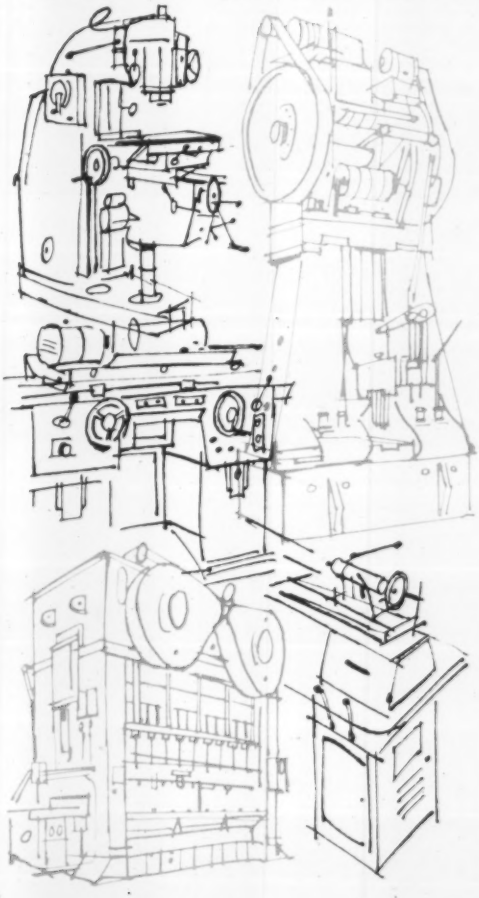

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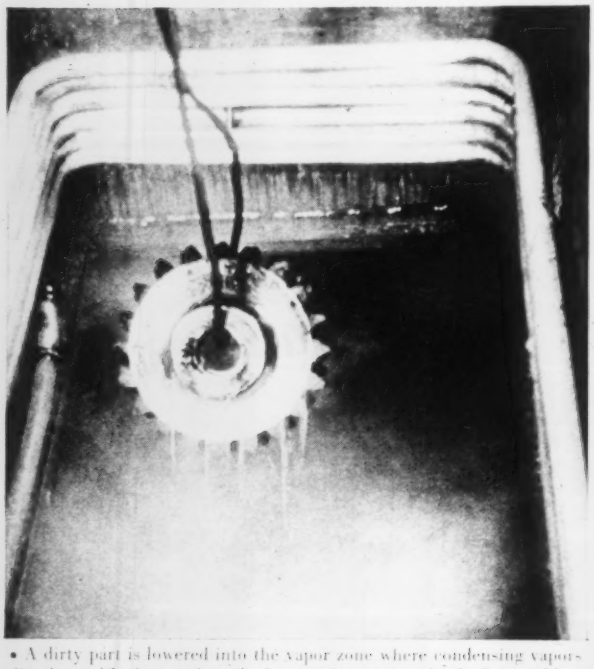
PRODUCT NEWS

# Vapor degreasing offers you a simple, economical way to clean metal

## *Here are the facts . . .*

People who are not familiar with vapor degreasing often think of it as a complicated and costly process. Actually, it is simple, fast, effective and economical. Here's how the process works:

**Vapor Degreasing Is Simple**—A vapor degreaser is essentially a metal tank of the proper size to handle the parts to be cleaned. Trichlorethylene, a non-flammable solvent for all types of oily and greasy contaminants, is heated in the bottom of the tank to its boiling point of 188°F., causing hot vapors of the pure solvent to fill the space above the liquid. Height of the vapor zone is set by cooling coils around the inside of the tank wall near the top. Here the vapors are condensed, and the liquid condensate is returned to the tank for re-use. Because the vapors are 4.5 times as heavy as air, they do not mix readily with the air above the tank.



• A dirty part is lowered into the vapor zone where condensing vapors dissolve and flush away the soil—leaving the part completely clean and dry.

**Vapor Degreasing Is Thorough**—Cleaning takes place when soiled metal parts are suspended in the hot vapors. The vapors instantly begin condensing on the cooler surfaces of the parts, dissolving and flushing away all soluble soils. The vapors can easily penetrate seams and recesses, so cleaning action is thorough, even on the most complicated shapes. For parts with stubborn soils or extra-heavy contamination, warm solvent sprays or liquid immersion steps can augment the cleaning action of the vapors. Since the final cleaning step in any vapor degreaser is a rinse in pure trichlorethylene vapors, re-soiling of the work is never a problem. Parts leave the degreaser thoroughly clean and dry . . . in minutes!

**Vapor Degreasing Is Economical!** Superior cleaning action virtually eliminates the problem of rejects. Parts come out dry; no need for a costly investment in drying equipment. Equipment is compact . . . saves floor space and fits smoothly into production-line operations. Modern equipment design provides better solvent mileage and saves you money while insuring consistently high cleaning quality.

Get the complete story on vapor degreasing! Send coupon today for free comprehensive booklet, or contact your nearby distributor of "Triclene" D trichlorethylene.

---

### *DISTRIBUTORS MEET TO HELP SERVE YOU BETTER*

Distributors of "Triclene" D recently attended a series of meetings, held by Du Pont, where vapor degreasing techniques and equipment design were demonstrated. Heart of the meetings was a discussion of Du Pont's new Cost-Analysis Service and the customer service available from the new Du Pont Sales Technical Laboratory. These meetings were designed to enable your distributor to serve you better and help keep your operation efficient. Your "Triclene" D distributor will be pleased to discuss these new services with you. Just give him a call.

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# *FOR MODERN METAL CLEANING*

## New Du Pont Cost-Analysis Booklet now ready to help you:

### Reduce present metal-cleaning costs . . . Choose the best cleaning method for your expansion or new installation

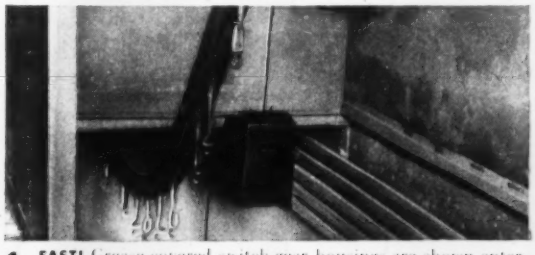
The details of Du Pont's new Cost-Analysis Service have just been compiled in booklet form. Copies are now in the hands of your distributor of "Triclene" D trichlorethylene.

With this Cost-Analysis Booklet your "Triclene" D trichlorethylene distributor, working with the local Du Pont Solvents Technical Representative, can help you determine the true cost of your metal-cleaning operations, spot items that are out of line and show you where and how *your present metal-cleaning costs may be reduced.* If you're planning *a new installation* or expanding your operation, the booklet can be used to help you select the most *economical* and *efficient* cleaning process.

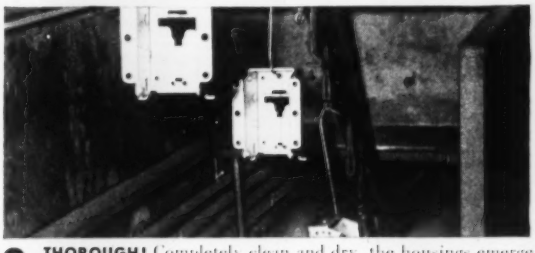
This new booklet describes a step-by-step method of preparing a complete cost analysis. It also provides blank sheets for making cost studies and information on each of the individual cost items to simplify the job of preparing an objective cost comparison. A sample analysis of competitive cleaning methods is included as a guide.

Mail coupon below or ask your distributor of "Triclene" D to show you Du Pont's new Cost-Analysis Service.

## Here's the kind of superior cleaning you get with TRICLENE® D



**1. FAST!** Grease-covered switch-gear housings are shown entering the degreasing unit. Conveyorized degreaser keeps cleaning operation in step with other production operations.



**2. THOROUGH!** Completely clean and dry, the housings emerge from the degreaser ready for inspection, assembly or further processing.

**3. EFFICIENT!** These gas meter cases being removed from conveyorized degreaser were cleaned effectively in one fast operation. Vapor degreasing is ideal for tough cleaning jobs, difficult soils, intricate parts.

**Backed by Du Pont's long experience, "Triclene" D's unique stabilizer formulation stands up against all degreasing stresses, assures brighter cleaning, makes cleanouts easier and less frequent.**

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☐ Please send me your booklet on vapor degreasing. ☐ I want information on Cost-Analysis. ☐ Have representative call.

*Name*_____ *Position*_____

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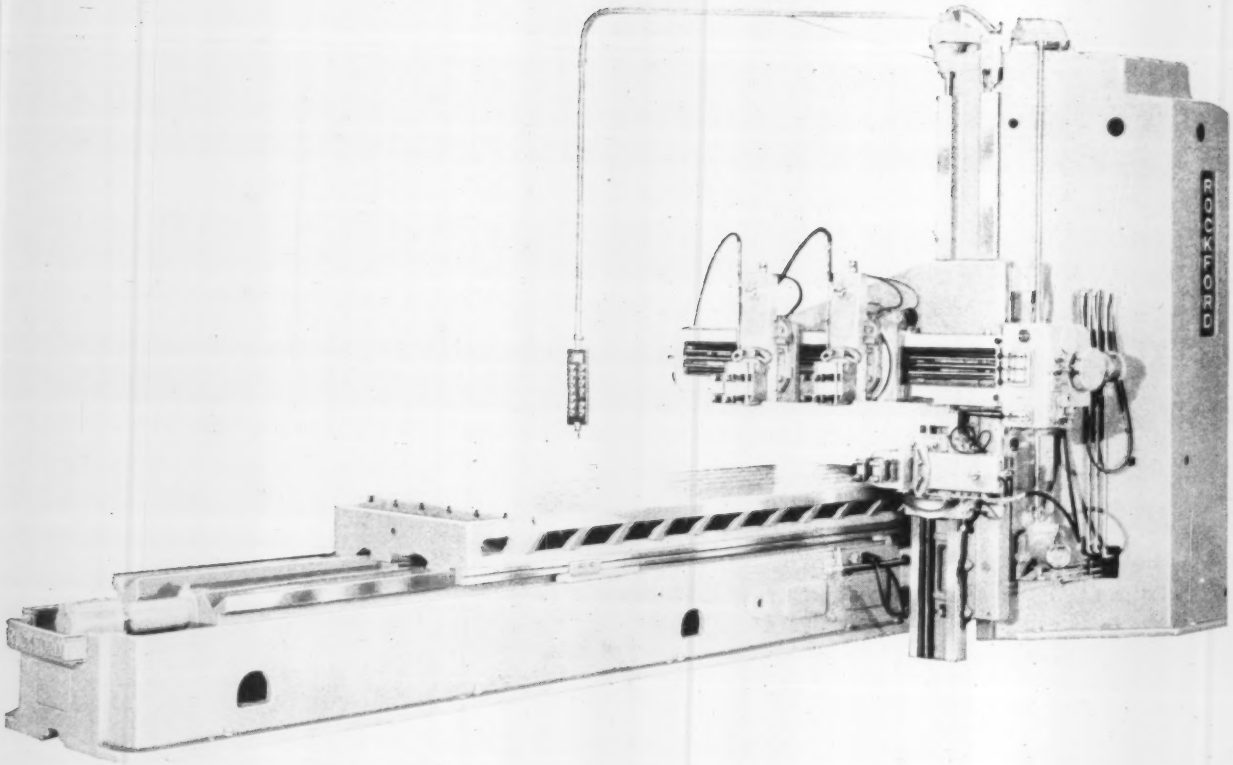

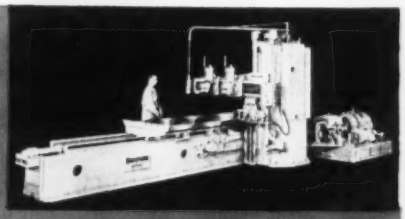

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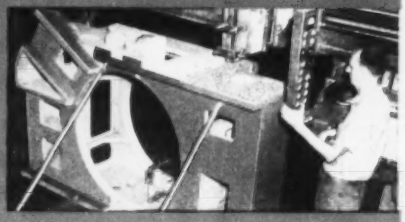

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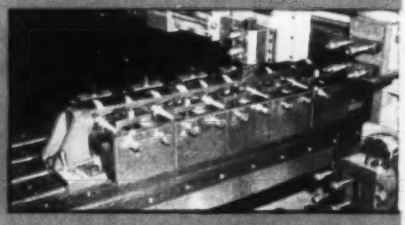

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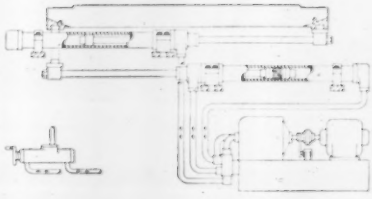

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# CALENDAR
## OF MEETINGS

**May 19-23, American Foundrymen's Society:** Annual castings congress and show, Public Auditorium, Cleveland. Society's address: Golf and Wolf Roads, Des Plaines, Ill. General manager: W. W. Maloney.

**May 21-22, American Iron & Steel Institute:** Annual meeting, Waldorf-Astoria Hotel, New York. Institute's address: 150 E. 42nd St., New York 17, N. Y. Secretary: George S. Rose.

**May 21-23, Electronic Industries Association:** Annual meeting, Sheraton Hotel, Chicago. Association's address: 1721 DeSales St. N. W., Washington 6, D. C. Secretary: James D. Secrest.

**May 26-28, American Management Association:** Packaging conference and exposition, Statler Hilton Hotel and Coliseum, New York. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

**May 26-28, American Society for Quality Control:** Annual meeting, Statler Hilton Hotel, Boston. Society's address: 161 W. Wisconsin Ave., Milwaukee 3, Wis. Administrative secretary: W. P. Youngclaus Jr.

**May 26-28, Triple Industrial Supply Convention:** Waldorf-Astoria Hotel, New York. Information: Thomas Associates Inc., 2130 Keith Bldg., Cleveland 15, Ohio. Manager: W. B. Thomas.

**May 27-29, Metallurgical Society, American Institute of Mining, Metallurgical & Petroleum Engineers:** Reactive metals conference, Statler Hilton Hotel, Buffalo. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

**June 1-4, American Gear Manufacturers Association:** Annual meeting, Homestead, Hot Springs, Va. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. C. Sears.

**June 1-5, National Association of Power Engineers:** Annual meeting, Ambassador Hotel, Atlantic City, N. J. Association's address: 176 W. Adams St., Chichigo 3, Ill. Secretary: Edward J. Schuetz.

**June 2-5, National District Heating Association:** Annual meeting and exhibit, French Lick Sheraton Hotel, French Lick Springs, Ind. Association's address: 827 N. Euclid Ave., Pittsburgh 6, Pa. Secretary-treasurer: John F. Collins Jr.

**June 2-5, American Nuclear Society:** Annual meeting, Hotel Statler Hilton, Los Angeles. Society's address: P. O. Box 963, Oak Ridge, Tenn. Executive secretary: W. W. Grigorieff.

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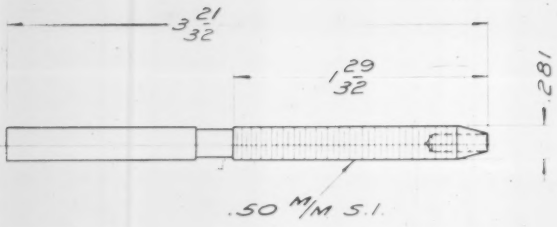


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| Part: | Micrometer Spindle |
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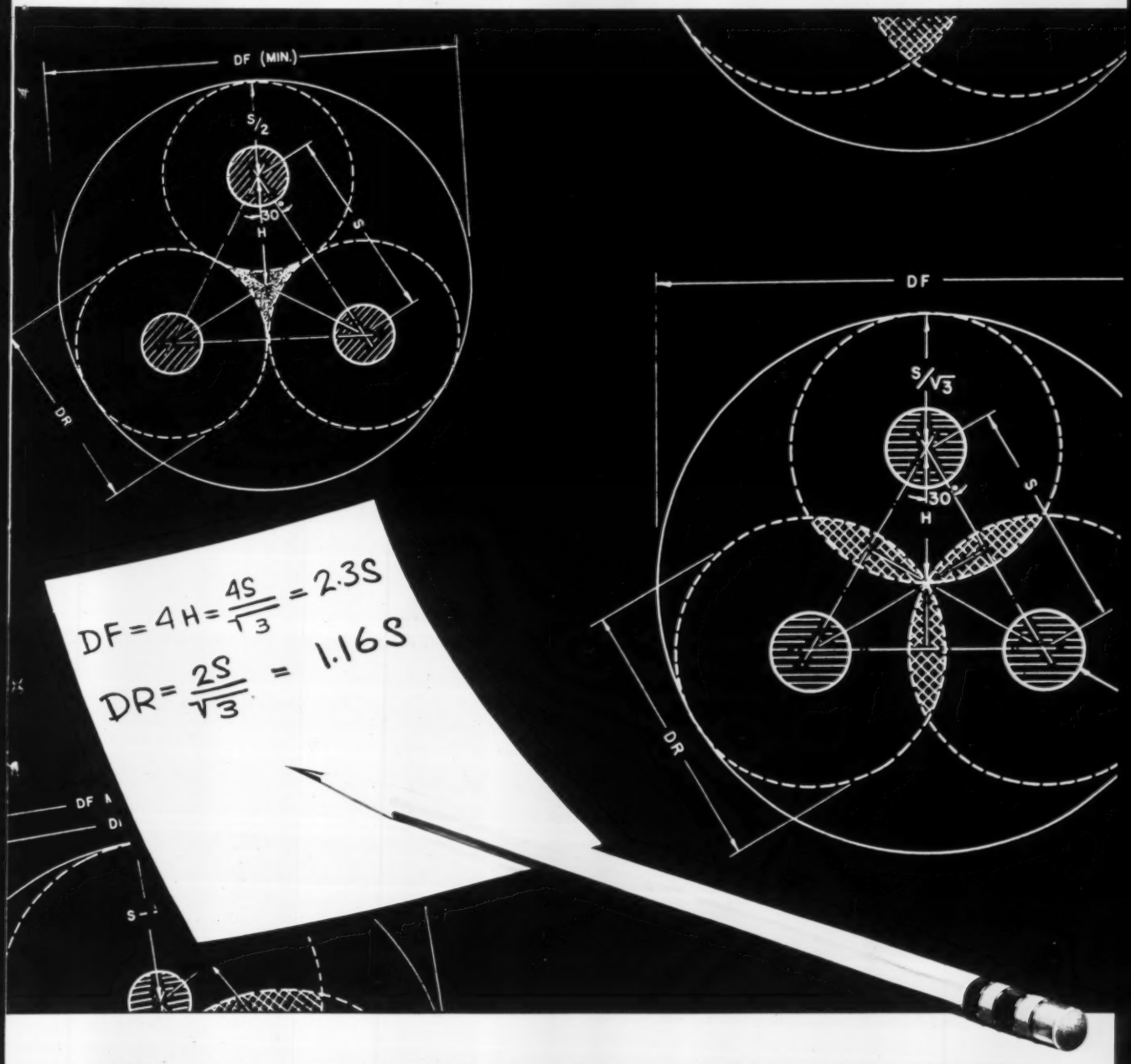
| Equipment: | 5C Lead Screw LANDMACO Threading Machine— 5VVV LANCO Hardened & Ground Head— LANDIS Tangential Chasers |
| Workpiece Material: | Stress-proof steel (C1144) Cold-drawn, strain-relieved, 260 to 280 Br. |
| Thread Specifications: | |
| Diameter | .281" |
| Length | 1-29/32" |
| Type | .50 M/M System International |
| Tolerance: | .2683-.2688" P.D., absolute concentricity and lead required |
| Production: | 195 per hour |
| Tool Life: | 625 pieces—average between chaser grinds |

Vol. 5 No. 1

# NATIONAL CARBON COMPANY'S CARBON AND GRAPHITE NEWS



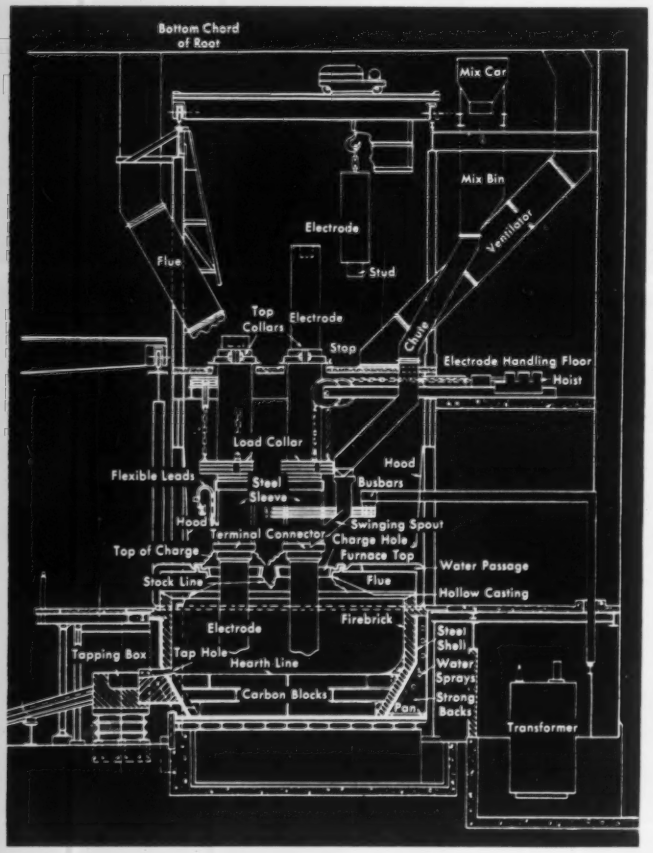

## DESIGN AND CONSTRUCTION OF THE SUBMERGED ARC FURNACE

By W. M. KELLY, *Plant Metallurgist*, Niagara Works
Electro Metallurgical Company, Division of Union Carbide Corporation

# DESIGN AND CONSTRUCTION OF THE SUBMERGED ARC FURNACE

## . . . THE MODERN METALLURGICAL TOOL

By W. M. Kelly, *Plant Metallurgist*, Niagara Works
Electro Metallurgical Company, Division of Union Carbide Corporation




**The Submerged Arc Furnace is a modern metallurgical tool for producing such industrial products as: Alloys, Calcium Carbide, Abrasives, Pig Iron, Phosphates and Titanium Dioxide. Shown is general cross section of typical ferroalloy furnace, auxiliaries and supporting structure.**

## *Introduction*

The first commercial submerged arc furnaces were placed in operation in the late 19th century. To a large degree their design has remained (for over a half century) a matter of arbitrary decision without formalization to ensure the most suitable metallurgical conditions. In general, this type of furnace has been designed almost entirely from the standpoint of the electrical universe it represents and several outstanding papers have been written concerning the electrical design of these heavy current furnace circuits.

The concept of a submerged arc furnace as a large, high temperature chemical vessel was little explored, and only trial and error information concerning furnace sizes, shapes, depths and electrode sizes was available. Gradually it was discovered that certain furnaces were suitable for given products, but eminently unsuitable for others. As the variety of alloys and materials produced by submerged arc smelting grew, the need arose for a system of predicting desirable furnace characteristics.

During the 1920's, F. V. Andreae developed the concept of electrode periphery resistance designated by the formula:

$$k = \frac{E - D}{I}$$

where k = electrode periphery resistance
E = electrode-to-ground voltage
I = current per electrode
D = electrode diameter in inches

This relationship, known as a "k" factor, was arrived at by observation of vast furnace data and noting that given smelting operations seemed to have a typical product of furnace resistance and electrode circumference. Although published in several papers by Mr. Andreae, it went almost unused for many years. Later, Mr. Andreae expanded on the concept by equating the heat generated by current flow in an electrode with the heat conducted from an electrode submerged in a high temperature zone and combined this equation with the electrode periphery resistance concept. It was concluded from this combination that the power density in an electrode must be constant if it is a valid assumption that electrode periphery resistance is a constant. Thus a beginning was made to a useful relationship between electrical conditions of a furnace and the metallurgical results.

During the early 1940's, after consultation with Mr. Andreae, the writer applied this concept to an accumulation of phosphorus furnace and ferroalloy furnace data for various products. In 1950, ranges of "k" factor were established for the principal submerged arc operations. This was based on the furnace data then available. From these data an attempt has been made to derive additional information relating to "k" factors and to associate this information with other design and operational considerations to formalize a suitable system for designing submerged arc furnaces with metallurgy in mind.

## *Electrical Conditions*

Since submerged arc furnaces are *electric* furnaces, it is of prime design importance that there be a thorough understanding of the relation between electrical conditions and

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metallurgical results. Obviously a 10000 kw. furnace cannot be run at an indiscriminate voltage, and so the voltage-current relationship for a given load must be understood. The "k" factor concept provided this understanding for constant power densities.

Typical "k" factor values for the major submerged arc furnace operations are shown in Figure I. These ranges for a given product merely reflect the available data and were a first attempt to provide an orderly picture of the range of electrical conditions employed by these operations. In a few cases, such as 50% ferrosilicon, data were available for an exceptionally wide range of conditions. The figures shown represent the area where maximum performance results were obtained.

**TYPICAL "K" FACTORS FOR SUBMERGED ARC OPERATIONS**

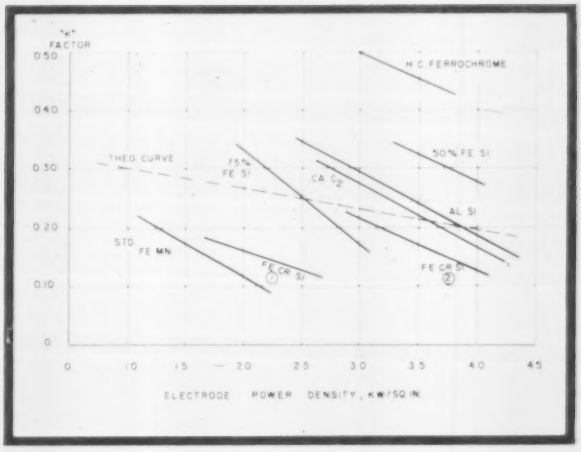
| PRODUCT | "K" FACTOR |
|---|---|
| PHOSPHORUS | .75 — 1.00 |
| H.C. FE CR (Low Si) | .35 — .65 |
| 50% FE SI | .24 — .34 |
| H.C. FE CR (High Si) | .20 — .30 |
| CA $C_2$ (Continuous) | .19 — .22 |
| (Packets) | .28 — .32 |
| 75% FE SI (Continuous) | .16 — .20 |
| (Packets) | .25 — .30 |
| FE CR SI (2-Stage) | .12 — .17 |
| SI MN | .10 — .15 |
| STD. FE MN | .08 — .13 |

(FIGURE I)

The high-carbon ferrochrome (low silicon) designates the normal sales grades of ferrochrome containing 4-6% carbon and 2% silicon. High-carbon ferrochrome (high silicon) indicates the process grades of alloy containing approximately 6% silicon, but also encompasses present day charge chrome and minimum 7% carbon grade. Each of the specific grades of ferrochrome will demand its own specific range of electrical conditions.

Most of the figures represent data taken from covered three-phase furnace operations, although, open furnaces and single-phase furnace data are also included and fall in the same ranges. Two ranges are shown for both calcium carbide and high per cent ferrosilicons. In both cases the higher range represents the electrical conditions employed by the old design rectangular packet furnaces.

The range of electrical conditions represented by these figures constituted a challenge to the development of a furnace design principle that would relate electrical, dimensional and metallurgical requirements. For each operation where sufficient information was available, a study was made of the relationship of electrical conditions to such factors as efficiency, recovery, alloy composition and similar performance characteristics. The random design experience of the industry had resulted in furnaces of quite different dimensions and electrode sizes for given loads, and data were available for given operations at widely different power densities. A broad relationship between power density and "k" factor has gradually been accumulated for most of the major products shown in Figure II. Part of these data were compiled from information gathered in Europe which allowed an extrapolation not previously available from Electro Metallurgical Company data alone.




(FIGURE II)

These curves in Figure II do not represent all of the random operating experience available. Rather, they are selected data representing what is known to be satisfactory working areas for fully competitive performance. Operations on many of these products at "k" factors far removed from the indicated relations are often encountered in the industry. For example, 50% ferrosilicon has often been produced at a "k" factor of 0.15 compared to the level above 0.30 shown on the curve. Such operations were normally substandard in some performance phase, and the indicated curves represent satisfactory operating conditions so far as present knowledge can define them.

It was previously noted in connection with Figure I that packet furnace data for calcium carbide and high per cent ferrosilicons indicated consistently higher "k" factors than did continuous electrode furnaces. The slopes of the curves for these products in Figure II are thus determined. One of the notable features of the packet furnaces was invariably the fact that much lower power densities, in terms of kw. sq. in. of electrode cross section, were employed as compared to the continuous electrode furnaces. This fact raised the question of whether there was an electrode "shape factor" to be taken into account. The inclusion of European data, where operations are generally conducted at lower power densities, provided curves of the same general slope for continuous electrodes as those derived from packet furnaces. The curve for standard ferromanganese is a typical example of data derived only from continuous electrode operations. It was thus concluded that shape of the electrodes did not have a major distorting influence.

Other curves shown included both single-stage and two-stage ferrochrome-silicon, an experimental aluminum-silicon operation previously published, and low-silicon high-carbon ferrochrome.

If the voltage and current were both held constant for a particular operation while the electrode size was increased, the result would be a lower power density and higher "k" factor. A theoretical curve for such a case is also shown on Figure II and the slope represents the effect of changing electrode size at constant voltage and current values. Note that the actual curves tend to exceed the slope of the theoretical curve and, therefore, represent a real change in electrical conditions attributable to the power density.

The initial stages of design for a submerged arc furnace must take these electrical relations into account. No other



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feature of furnace design can be properly determined until the desired "k" factors for the products in question have been determined and suitable power densities are in mind. Proper evaluation of these relations depends on the accumulation of a wide variety of operating results. The elaboration of this data, however, can provide a reliable and permanent basis for submerged arc design tailor-made to the product under consideration.

## *Electrode Size*

It has been the practice to select electrode size for a submerged arc furnace based on the anticipated current density for the operation contemplated. In general, an arbitrary decision is made concerning the power to be integrated and economics has dictated the highest possible current density in order to keep capital cost to a minimum. Expressed another way, it has been the practice to operate a given unit at the highest load that the electrodes would allow in order to extract maximum production from the unit; normally this maximum production does not coincide with the point of optimum performance.

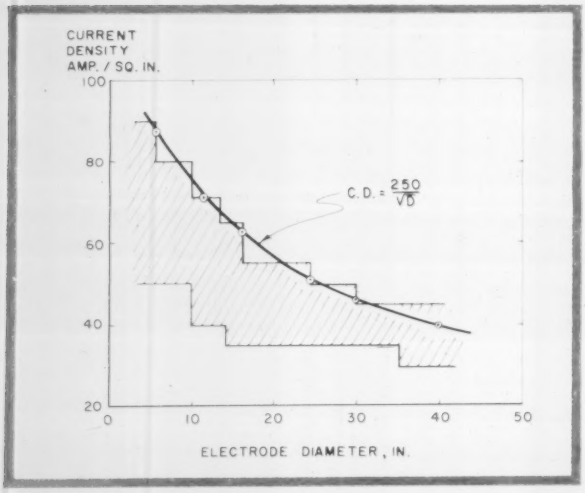
For the purposes of consistent design, it is necessary to bear metallurgical results in mind and some factor other than electrode size might more appropriately be made the limiting factor. Once the unit is properly arranged for optimum performance, it can then be operated at the proper economic level with a reasonable insight into the consequences. Selecting electrodes by current density is unsatisfactory since it tends to provide for good electrode performance without regard to metallurgical performance. Since reasonable limits to current density are important, it becomes necessary to relate this parameter to the other electrical conditions dictating the furnace design.

Figure III presents a graphical illustration of the generally accepted current density values for standard prebaked carbon electrodes. Superimposed on this graph is a curve derived from the empirical equation:

$$C = 250 / \sqrt{D}$$

where C = current density, amp. /sq. in.

D = electrode diameter, inches




(FIGURE III)

This equation represents the high edge of the current density range as shown by the graph and should provide a useful basis for furnace design which would assure satisfactory electrode performance.

This guide to maximum current densities plays a most important role in operations having a low "k" factor, such as standard ferromanganese where current densities at suitable power densities always tend to run high. Many other operations utilizing high "k" factors will be properly designed at current densities far below this maximum guide.

Under the present system of design, the first estimate of electrode size would be made from the power density – "k" factor relations of Figure I. Choice of power density should be influenced by accumulated experience, ability to obtain the corresponding "k" factor–taking transformer limitations and reactances into account, and finally by the effect of these choices on electrode current density using Figure III as a guide.

For example, suppose it is desired to design a 7000 kw. standard ferromanganese furnace. By selecting points from the appropriate curve relating power density and "k" factor (Figure II), it is possible to calculate the required electrode size, arc voltage and secondary current to satisfy that relationship. The resulting current densities can then be checked against the current density guide until values approaching the curve $C = 250 / \sqrt{D}$ are obtained. Thus satisfactory conditions for both metallurgical performance and electrode performance are obtained. Actual figures for the case in question are tabulated. These calculations show that for a 7000 kw. load, a power density of 2.2 requires an electrode of 37 inches diameter but results in an excessively high current density for good electrical performance.

**SELECTION OF ELECTRODE SIZE**
**STANDARD FERROMANGANESE**

| DESIRED LOAD KW | 7,000 KW-3 PHASE | | |
|---|---|---|---|
| "K" FACTOR (from curve) | .10 | .14 | .12 |
| POWER DENSITY | 2.2 | 1.8 | 2.0 |
| ELECTRODE SIZE FOR P.D. | 37 | 40 | 38.5 |
| ARC VOLTAGE | 45 | 51 | 49 |
| SEC CURRENT | 52000 | 45500 | 49400 |
| CURRENT DENSITY | 48.5 | 35 | 42.5 |
| ALLOWABLE C.D. (from guide) | 42 | 40 | 41 |

(FIGURE IV)

Assuming there is a choice of standard sizes in prebaked electrodes, a 35 inch diameter would be eliminated from consideration and a 40 inch diameter, being the next larger standard size, would be chosen. This electrode would result in a slightly lower power density and allow a slightly higher "k" factor. The current density in this case would be below the maximum considered satisfactory. An academic balance would indicate an electrode of 38.5 inches should be chosen to arrive at agreement between allowable and actual current densities within the limits of the other electrical requirements.

## *Electrode Spacing*

After determination of desired load, electrical relationships and electrode size, the next important feature of three-phase furnace design to be determined is electrode

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spacing. In the past, this has been arrived at by experience and various arbitrary relations. One design method commonly employed has been to allow a clearance between electrodes equal to one electrode diameter. For relatively easy smelting operations, this is sometimes increased to two electrode diameters. Many of the covered all-purpose furnaces in the industry have a typical electrode spacing of 1.5 diameters clearance. This dimension has been dictated, at least in some degree, by the clearance requirements for accessory equipment over the furnace and has only passing relationship to metallurgical performance. In some operations such as continuous electrode smelting of high per cent ferrosilicon, it has been found desirable to compress this spacing to nearer one electrode diameter clearance.

Recently, an attempt was made to develop a design theory along the lines that electrodes represent point sources of heat and that the heat radiated spherically in all directions. Under this assumption, the electrode spacing could be related to the cube of the reaction zone diameter. If a suitable spacing were known for a given operation at a fixed power input, it would be possible to design furnaces of any other size based on this proportionality. At low power densities, the assumption that the electrodes represent point sources of heat becomes less and less valid. The heat does not radiate spherically, partly as a result of the reflecting effect of the large electrode itself. This approach was therefore discarded in favor of the theory that power is dissipated over a fixed area of reaction zone and the kilowatt input is proportional to the square of the reaction zone diameter.

In order to test the relationship between electrode spacing and power input, data were accumulated from 50% ferrosilicon operations where the greatest variety of furnace sizes and loads was available. On the assumption that operating experience had led to a proper electrode spacing for the furnaces of various loads, the linear, area and volume proportionalities were calculated. The results of the area calculation are shown in Figure V.

**ELECTRODE SPACING VS LOAD**
**50% FERROSILICON**

| ACTUAL FCE LOAD, KW. | ACTUAL SPACING, FT. | CALCULATED SPACING, FT. | RATIO CALC./ACTUAL |
|---|---|---|---|
| 12000 | 8.5 | 9.2 | 1.08 |
| 10900 | 8.5 | 8.8 | 1.03 |
| 10560 | 8.5 | 8.6 | 1.01 |
| 10100 | 8.5 | 8.4 | .99 |
| 11400 | 8.0 | 8.9 | 1.11 |
| 11050 | 8.0 | 8.8 | 1.10 |
| 10770 | 8.0 | 8.7 | 1.08 |
| 9500 | 8.0 | 8.1 | 1.01 |
| 7570 | 6.0 | 7.3 | 1.21 |
| 4320 | 5.5 | 5.5 | 1.00 |
| 4150 | 5.0 | 5.4 | 1.08 |

(FIGURE V)

The basis for the calculated spacings was taken to be an 8.5 foot spacing at a load of 10250 kw. This relation was selected due to a long record of particularly good furnace performance under these conditions.

Using the linear proportionality, a ratio of calculated to actual spacing for the furnaces in question ranged from 0.68 to 1.18, or a net range in ratio of 0.5. The volume proportionality resulted in a net range in ratio of 0.28 while the area relation gave the lowest net range of 0.22. General agreement between actual and calculated spacings was good throughout the entire range on an area basis, while the volume relations tended to stray off at the low end and the linear relation deviated widely at both ends of the range.

These data, and knowledge of the actual performance characteristics of all the furnaces listed, were taken as adequate indication that a furnace design rationalization based on an area concept was preferable to one based on either a linear or volume principle. It appeared satisfactory to assume that furnace load is proportional to the square of the electrode spacing.

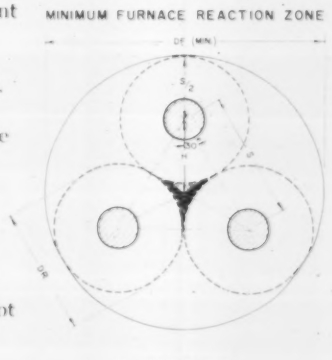
Fundamental furnace design data for each submerged arc operation can be collected by studying the performance of existing furnaces and arriving at load and spacing relationships that are proved satisfactory. Any other furnace size can be properly dimensioned based on this proportionality.

## *Reaction Zone and Crucible Diameter*

With the acceptance of the area concept of power dissipation in a submerged arc furnace, it becomes possible to speculate on the size of reaction zones and to relate these zones to electrode spacing.

The first insight into the relationship is provided by determining the minimum possible reaction zone. Figure VI shows the relationship between minimum reaction zone diameter and electrode spacing for a triangularly arranged furnace. In this figure, minimum reaction zones are drawn about each electrode so that the edges just touch between electrodes. By normal trigonometric relations it can be shown that this minimum reaction zone diameter, $D_r$, is equal to the electrode spacing and that the minimum furnace diameter, $D_f$, circumscribing these reaction zones is equal to 2.16 times the spacing. Thus when: $D_f = 2(H + \frac{S}{2}) = 2.16S$, $D_r = S$.

It stands as self-evident that this arrangement would measure the minimum reaction zone. Any diameter less than this would not allow the flow of fluid materials from one electrode to another. In fact, the shaded area at the center junction of the three zones represents an undesirable dead spot in the furnace.




(FIGURE VI)

For the other extreme, a maximum reaction zone was assumed to be one in which the edge of one reaction zone extended to the edge of the electrode centered in an adjoining reaction zone, as shown in Figure VII. In this case, it can be shown that the maximum reaction zone $D_r$ is equal to twice the spacing, less the diameter of one electrode. Thus when: $D_f(\text{Max.}) = 2[H + (S - \frac{DE}{2})] = 2.31S - DE$, $D_r = 2S - DE$.

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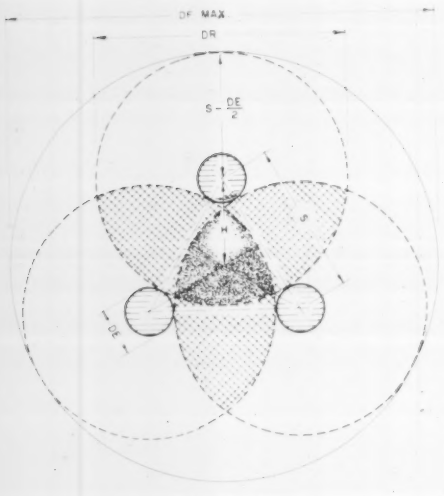
MAXIMUM FURNACE REACTION ZONE




(FIGURE VII)

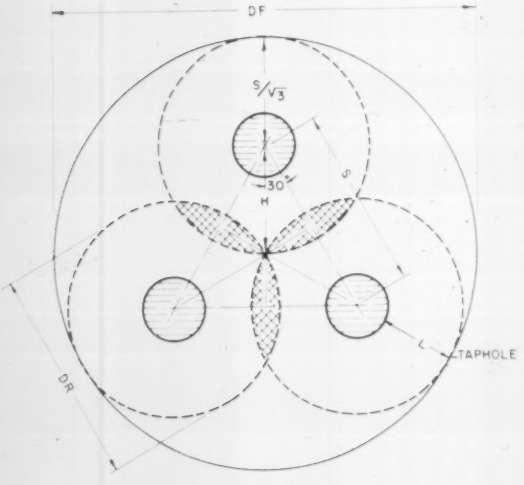
The maximum furnace diameter, $D_f$, circumscribing these reaction zones is represented by the equation shown in the figure.

In the center shaded area in this case, all three reaction zones overlap, in what would be an overly active and uncontrollable region of a submerged arc furnace. This represents the opposite undesirable extreme from the dead zone between minimum reaction zones.

After studying these extremes, it was concluded that an optimum furnace reaction would be one in which adjoining zones slightly overlapped and where all three just touched in the center, without leaving either a dead or an overactive center area. Such a condition is shown in Figure VIII. This diagram indicates that the relationship between reaction zone and electrode spacing is for the reaction zone to be equal to 1.16 times the spacing. The active furnace diameter corresponding to these reaction zones would then be 2.3 times the spacing. Thus when:

$D_f = 4H = \sqrt{\frac{48}{3}} = 2.3S$, $D_r = \sqrt{\frac{28}{3}} = 1.16S$.

OPTIMUM FURNACE REACTION ZONE




(FIGURE VIII)

## *Furnace Shell Diameter*

The foregoing equations provide a basis for determining the diameter of the actual furnace crucible. Practical experience has indicated that it is not desirable to have the molten zone contact the furnace lining. It appears that an empirical addition to the calculated furnace diameter, $D_f$, is desirable. Existing furnace data suggest that the diameter of crucible inside the lining should be approximately $1.15 \times D_f$.

In the design of many furnaces, it has been customary to place the center of the electrode triangle slightly in front of the center of the shell. This practice tends to ensure that the tap hole area is the weakest part of the furnace and burnthroughs are not likely to occur at other places around the circumference. This practice tends to result in shells of larger diameter than necessary and it is recommended that the center of the electrode triangle and furnace shell coincide. In the case of rotating hearth furnaces, this symmetry is essential.

One of the critical furnace dimensions is the distance from the electrode face to tap hole and in order to satisfy this dimension, the electrode triangle has been moved forward. This distance varies for different operations for the same reason that electrode spacing varies; i.e., due to varying refractoriness of the materials being smelted. The electrode spacing and distance to tap hole should be related. From Figure VIII, it can be seen that distance from electrode face to reaction zone can be expressed by the equation $L = \sqrt{\frac{S}{3}} - \frac{DE}{2}$

## *Furnace Depth*

One of the most difficult features of furnace design to reduce to formal relationships is furnace depth. Various empirical approaches in the past have included such relations as voltage per foot of depth, without being adequate measures of depth requirements. Using the theory that electrode tips are point sources of heat, the suggestion arises that power input is proportional to the cube of depth. This relation does not seem to bear out in actual practice and the point source theory was discarded in the case of electrode spacing.

Observation of many furnace reaction zones during digouts and repairs has led to certain useful information. In smelting operations such as the ferrosilicons, ferrochrome-silicon and aluminum-silicon alloys, it has been noted that a highly conductive matrix of hearth metal fills the bottom of the furnace to a depth within inches of the point that the electrode tips have operated. In certain operations where electrode tips have normally been 60 inches off hearth, there will be upwards of 55 inches of conductive hearth metal beneath the electrode.

It has been customary to think of the interior of a submerged arc furnace as being occupied by materials in progressively more complete states of reduction, ranging from raw materials at the surface to final product at the hearth line. The heavy layer of hearth metal always encountered, now suggests that the furnace is actually divided into two relatively distinct zones. Below the electrode tips is the observed hearth metal of high conductivity, reasonably uniform composition, and essentially reacted material. Above the electrode tips are the unreacted and partially reacted raw materials of relative nonconductive nature.

In the upper zone of the furnace, heat transfer must be

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preponderantly through the mechanism of convection, since this is the zone where reaction occurs and hot reaction gases are rising. In the lower zone, relatively little gas passes to aid convection. The more highly conductive nature of the hearth metal suggests heat transfer in this zone is predominantly by conduction.

From a practical operating standpoint, it is desirable to suffer as little heat loss as possible and the temperature of the off-gases from the surface of the furnace should be kept to a minimum. This factor governs the desired furnace depth from mix surface to electrode operating depth. On this basis, the upper portion of the furnace can be treated essentially as a packed tower with heat being transferred from the hot gases to the particles of mix.

The usual relationships for such a case indicate that the rate of heat flow is directly proportional to the unit heat transfer surface, the coefficient of heat transfer, the cross sectional area of the mix bed, the depth of heat transfer bed and the temperature difference.

In the design of an electric furnace for a given smelting operation, the transfer coefficient and unit heat transfer surface would be constant mix characteristics determined by the raw materials for any size furnace. Similarly, the desired temperature difference would be a constant. A previous relation has indicated that the electrode spacing and the area should be proportional to the load.

Under these circumstances it is evident that the rate of heat flow is directly proportional to the depth. It is indicated that at constant power density, the depth of mix from electrode tip to surface would be constant for any size furnace. With increases in power density, this depth should be increased proportionately.

The lower portion of the furnace burdened with hearth metal can be represented as a large heat conductor where flow of heat is directly proportional to thermal conductivity, area and temperature differential, and inversely proportional to depth.

For a given smelting operation, both thermal conductivity and temperature differential are constants and the rate of heat flow is directly proportional to the area and inversely proportional to the depth of hearth metal. Since the sensible heat in tapped metal is a significant energy loss, it is desirable to tap at the lowest temperature consistent with the hot metal handling techniques and skulling characteristics of the alloy involved.

For any given power density and accompanying heat distribution pattern, the amount of heat lost in the tapped metal would be dependent on the depth of hearth material. An increase in power density would tend to demand an increased depth of hearth metal to keep conducted heat from increasing. It is concluded that the two zones of depth should be constant for constant power density, regardless of total load, and increases in power density must be accompanied by proportional increases in furnace depth to maintain the same level of heat losses.

Although these concepts of heat flow in a submerged arc furnace are oversimplifications of actual conditions, they nevertheless provide a consistent basis for design.

A useful relationship, therefore, becomes the ratio of inches of electrode submerged in the mix to the distance of electrode tips off hearth. This ratio varies widely with different smelting operations and typically ranges from 3.0 to 0.3 for the normal alloys produced. Knowledge of these values materially aids in proper furnace design for a given operation.

## *Dimensional Relations — Packet & Continuous Electrode Furnaces*

Before the days of covered submerged arc furnaces, a common design arrangement was a rectangular furnace shell with three rectangular electrodes arranged in line. These rectangular electrodes were made up of groupings or packets of square carbons. Hence, this type of furnace became known as a packet furnace.

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One of the more difficult problems in the past has been the translation of results from packet furnaces to continuous electrode furnaces. Many operations have been repeatedly demonstrated to be less satisfactory in continuous electrode furnaces than in packets.

Some of the more obvious differences in conditions of packet furnace operation have been the higher "k" factors and very much lower power densities that they employed. In order to design a continuous electrode furnace with the characteristics of a packet furnace, the concept of minimum reaction zone was applied to packets.

A typical packet electrode arrangement is exemplified by furnaces using three 20" x 80" electrodes arranged in a line on 5'6" centers or with 46" clearance between electrodes. A minimum reaction zone, therefore, extends midway between electrodes, or approximately two feet. If it is assumed that the reaction zones extend out equally all around the electrode, it is possible to determine the entire furnace reaction zone size.

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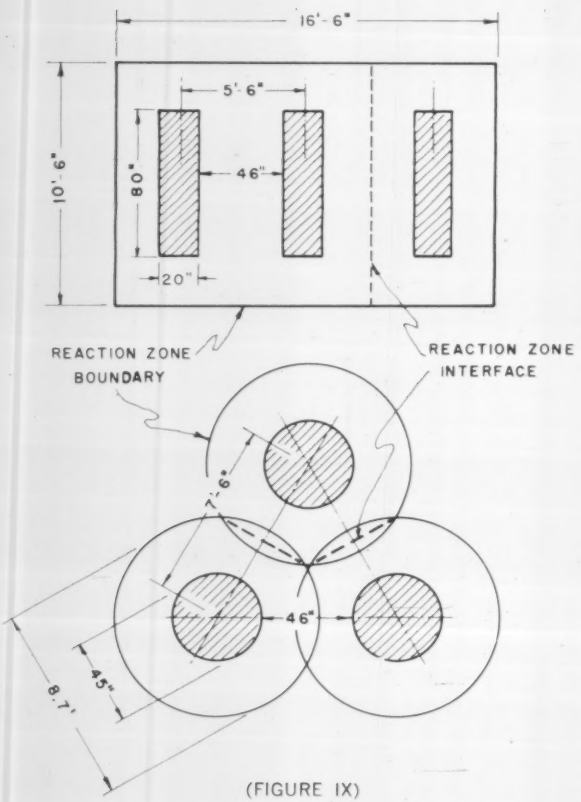


(FIGURE IX)

The reaction zone shown for a typical packet furnace measures 10.6 x 16.6 feet, based on the minimum reaction zone concept. It is interesting to note that actual reaction zone measurements made on this type of furnace have verified within inches the estimated reaction zone size.

Under the assumption that the reaction zone extends to the center of the area between electrodes, the two reaction zones of adjacent electrodes must join for the full length of the electrode. In continuous electrode furnaces, the minimum reaction zones join only at a point. A condition more comparable to the packet furnace, therefore, is the optimum reaction zone where the zones overlap slightly to approximate the line-contact between packets. With this reasoning as a basis, it is then possible to approximate packet furnace conditions in a continuous electrode furnace.

A continuous electrode furnace equivalent to this packet would have 45" electrodes on 7' 6" centers. The electrode power density in both cases is 1.76 kw sq. in., the reaction zone area per electrode is equal (38 sq. ft.) in both cases and therefore the reaction zone power density is equal at 49 kw sq. ft. and the distance between electrodes is essentially equal in both cases.

It is felt that the application of these principles to continuous electrode furnaces, based on packet furnace data, would allow the solution to many metallurgical problems characteristic of the continuous electrode furnaces. The trend indicated for continuous electrodes, based on comparison with the older packets, would be to larger diameters for existing loads.

## *Conclusion*

These design principles have been gradually evolved and applied so far as possible in the solution of various metallurgical problems. It is fully recognized that a vast amount of additional information is desirable and that certain of the present concepts are controversial. It is strongly felt, however, that the continued development of submerged arc furnaces depends upon the formulation of a system of design that relates the two important elements involved – electricity and metallurgy. It is hoped that this presentation will stimulate interest in the problem of proper metallurgical design and will serve as the basis for the continued development of much more complete design relationships.

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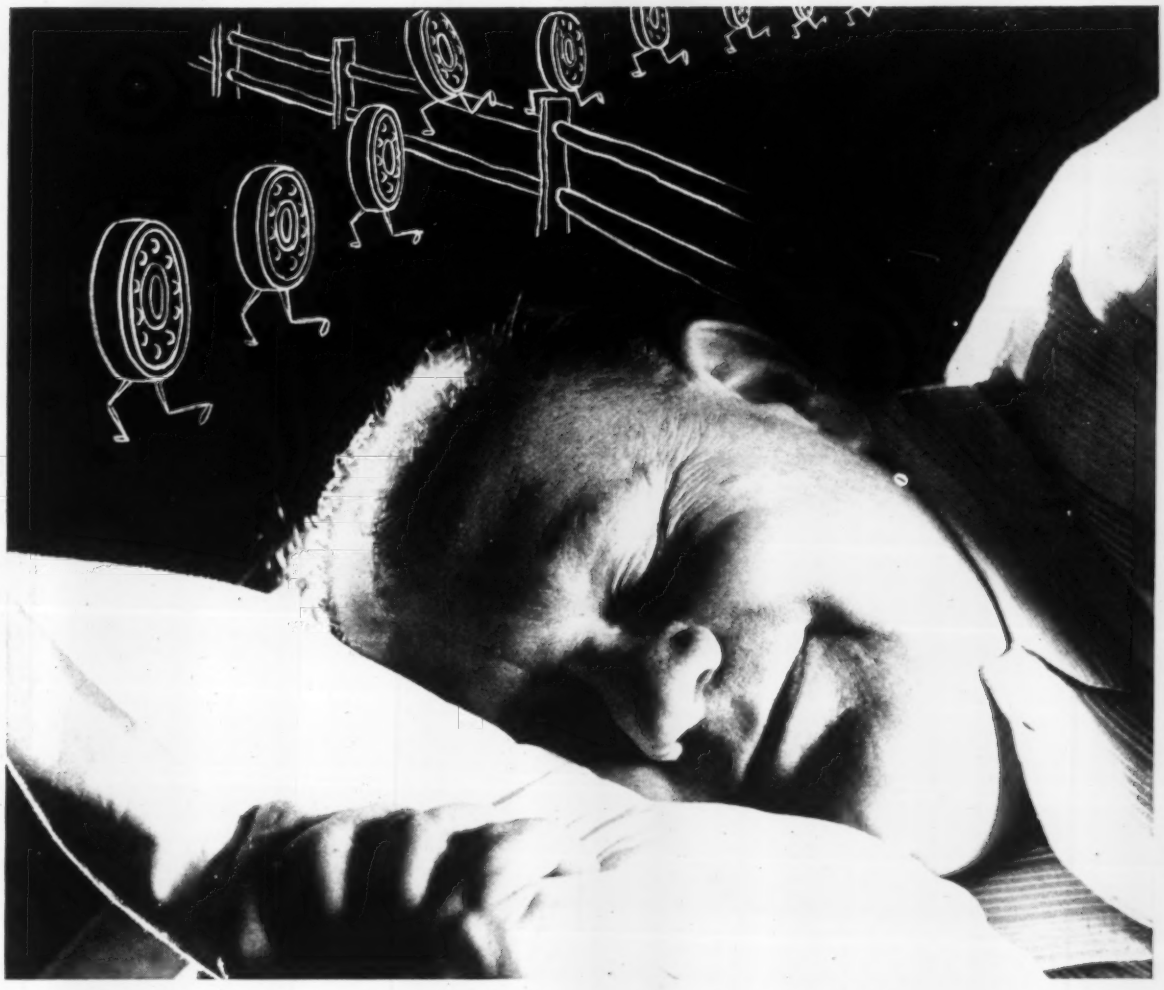

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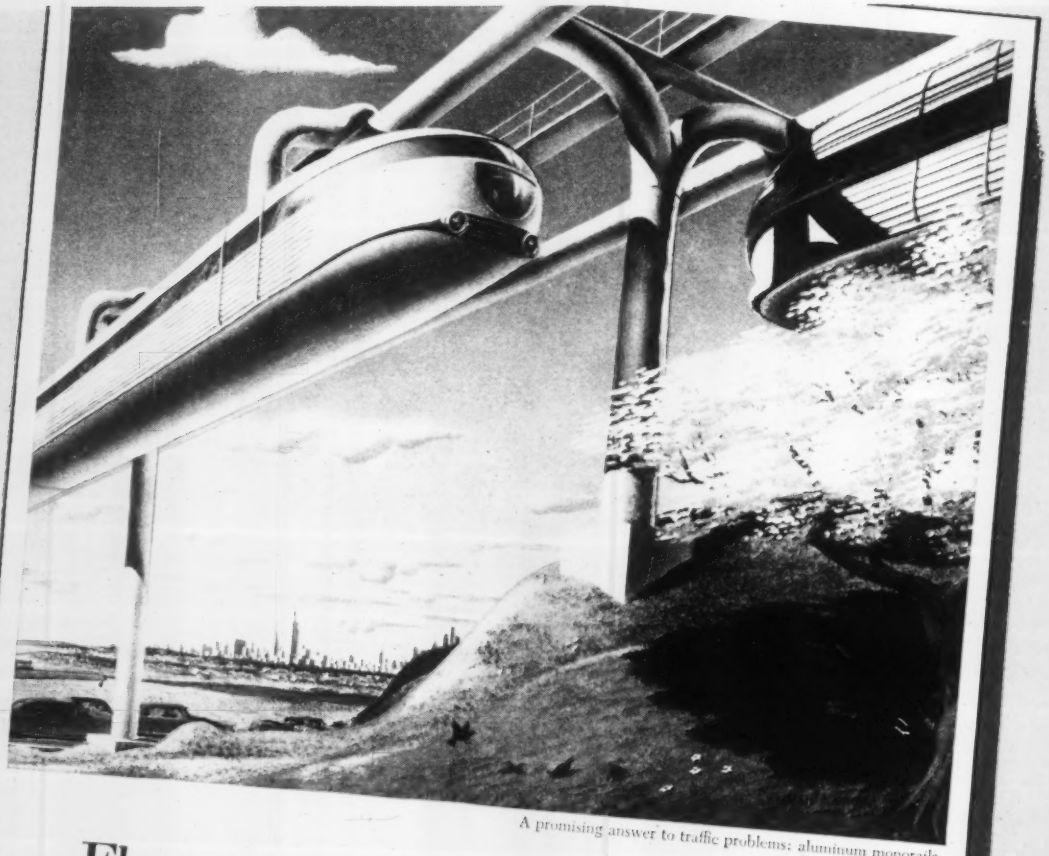

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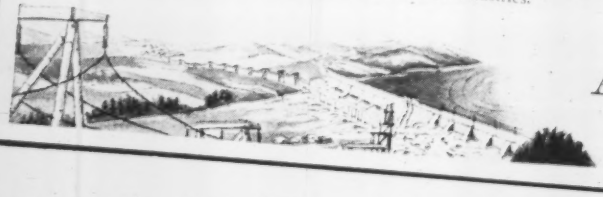

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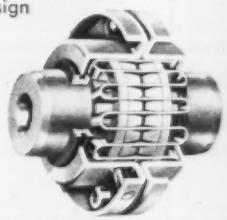

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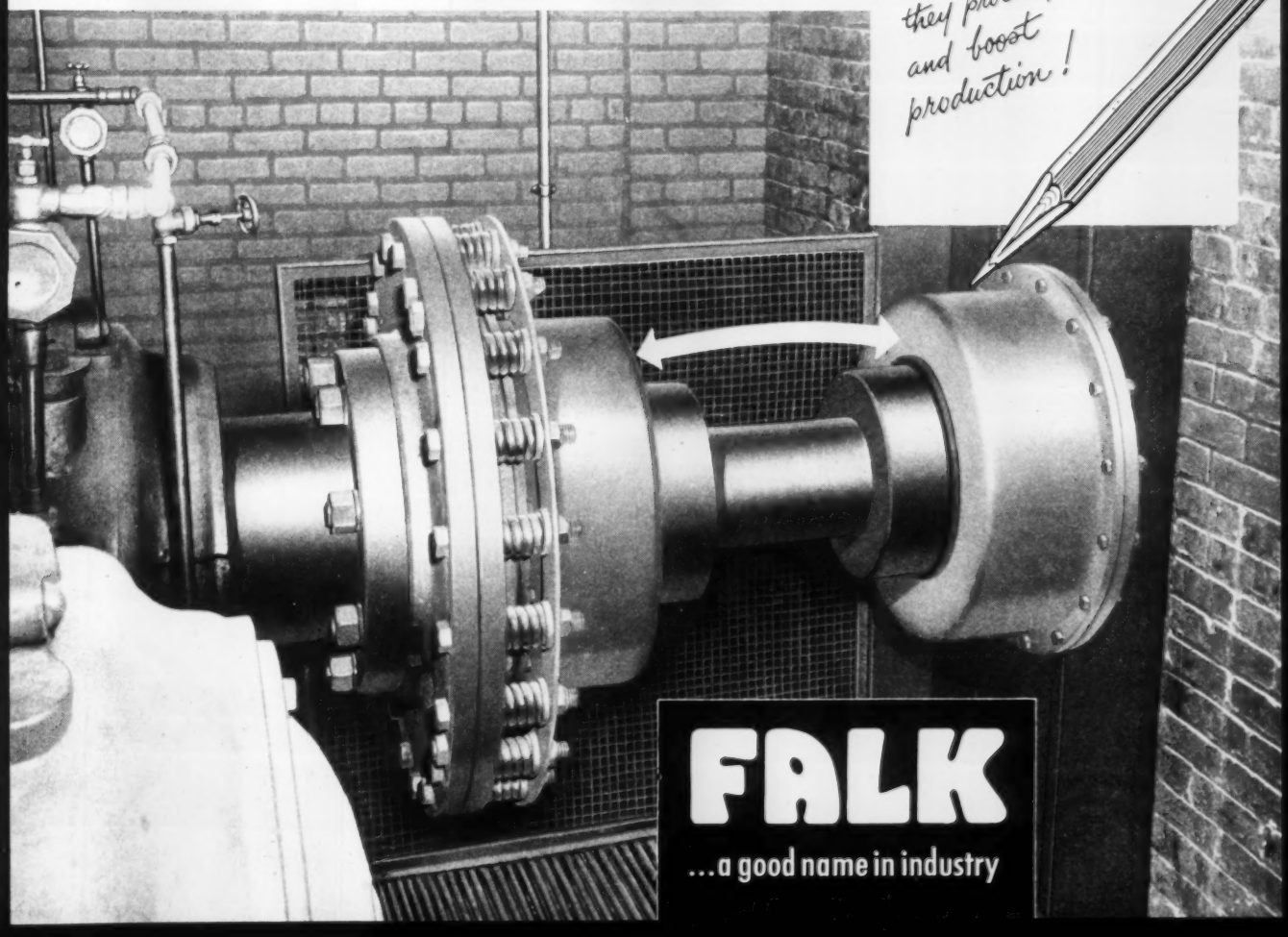

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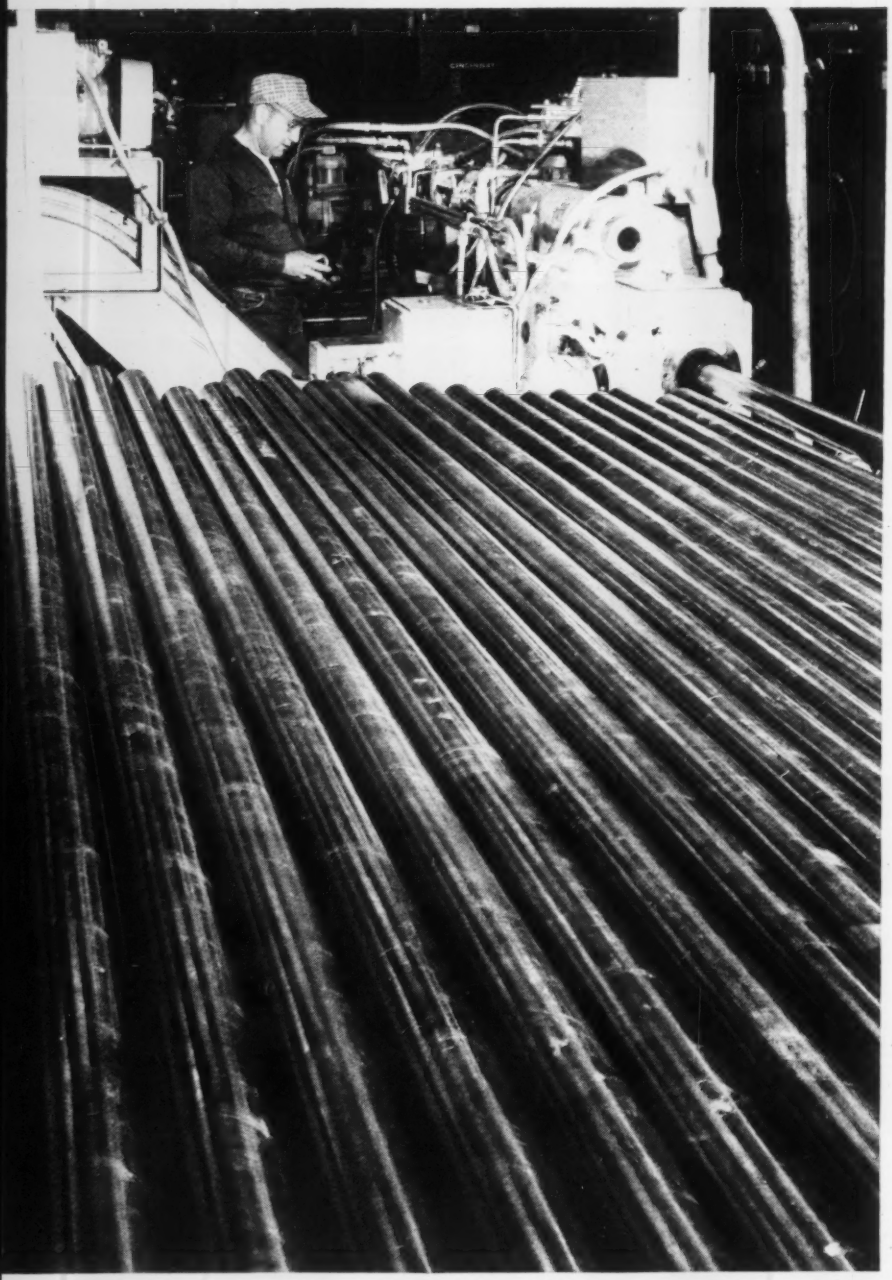

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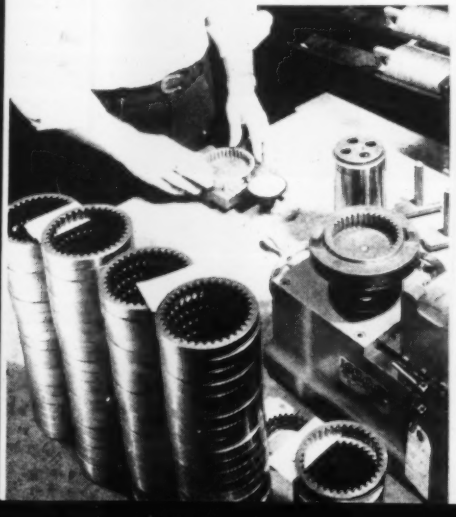

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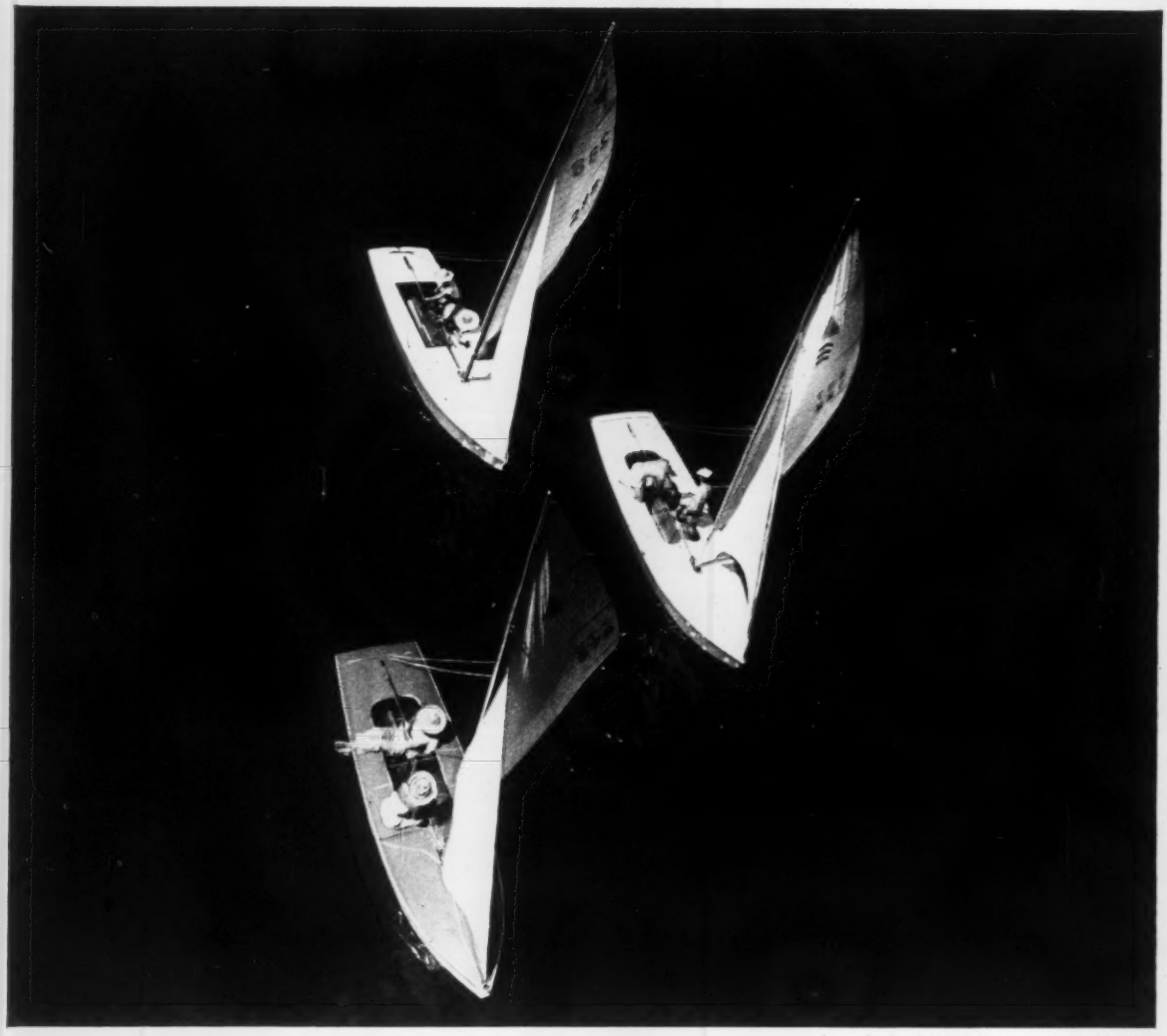

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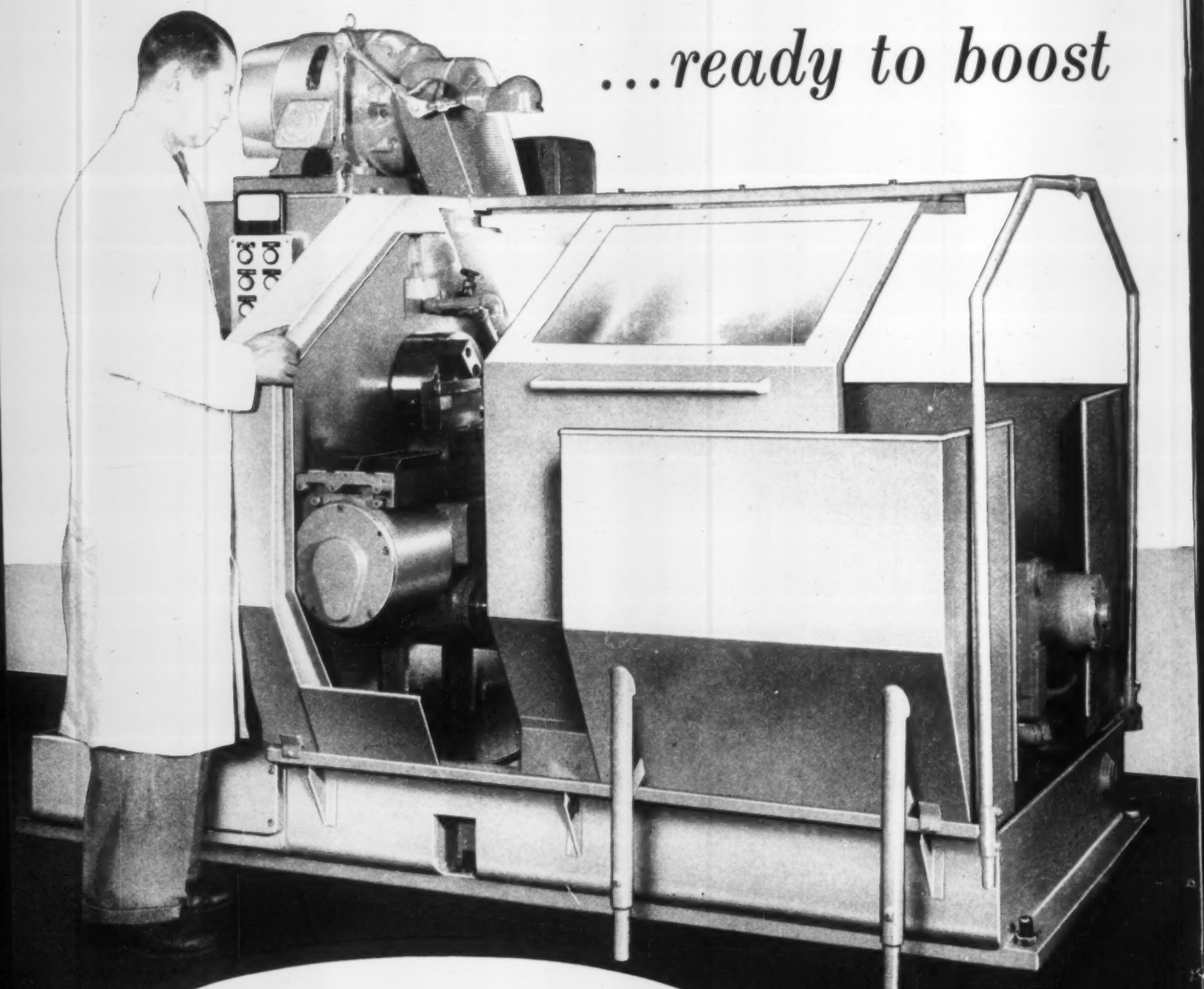

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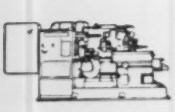

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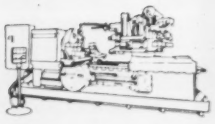

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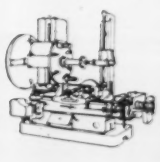

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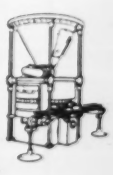

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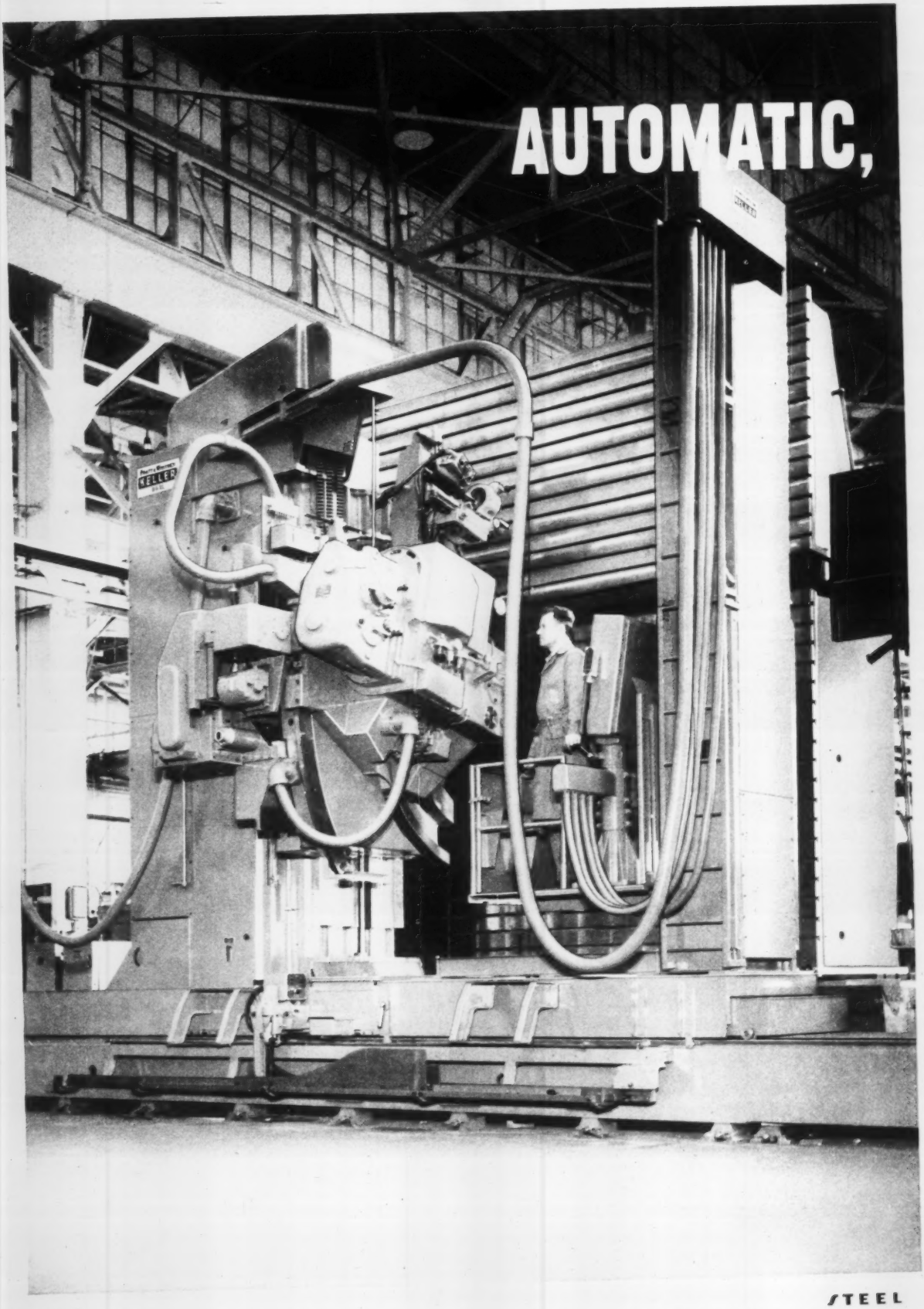
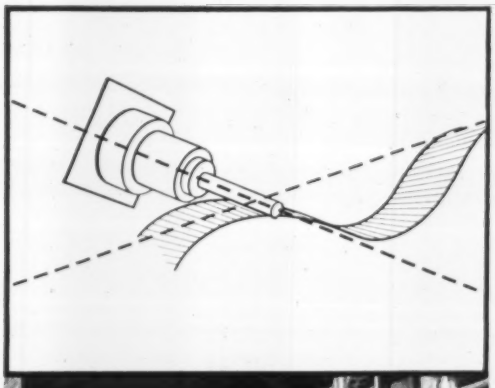
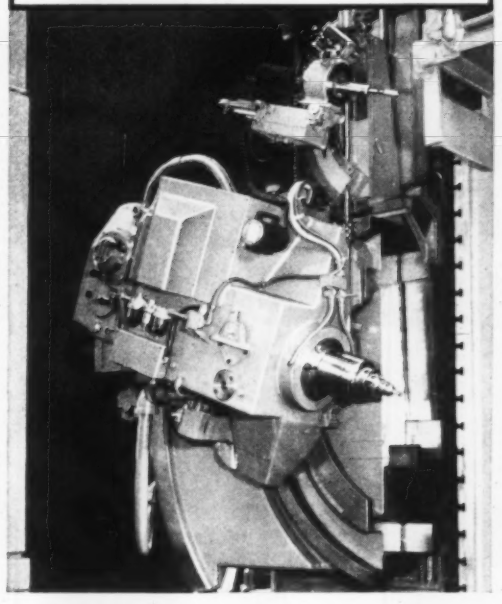

AUTOMATIC,
KELLER

# *here's a* NEW TWIST *in*
# TRACER-CONTROLLED MILLING





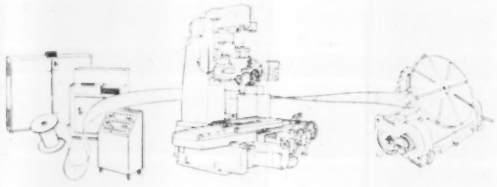
Pratt & Whitney Keller Automatic Tracer-Controlled Milling Machines have long been known throughout industry for their ability to produce complex, irregular 2- and 3-dimensional shapes. They bring outstanding speed, accuracy and economy to the manufacture of dies, molds, prototypes and production parts.

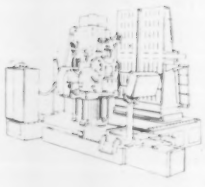
The special machine shown here – a modification of our giant Type BG-22 – adds a "new twist" to the already great versatility of these machines. This special machine can be operated as a standard Keller . . . profile-milling from a 2-dimensional template or duplicating a 3-dimensional full model. In addition, it is equipped with a specially designed milling head that has a range of tilt from 20° above to 20° below the horizontal. With the degree of tilt of the head and cutting tool controlled by a template, this machine will be used to generate "warped surfaces" by profile milling. This type of milling is frequently encountered in the production of aircraft structural components where the outer surfaces of the part must be accurately profiled and, at the same time, correctly twisted or "warped" to conform with the designed contours of the aircraft's surfaces. The development of this special Keller Machine makes it possible to produce these "warped surfaces" by the most direct, accurate and economical method.

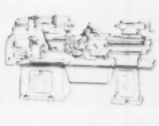
Your own operations may not involve the milling of "warped surfaces." But the example of this special machine demonstrates Pratt & Whitney's experience and engineering know-how in solving special production problems. And – whatever your requirements – for fast, low-cost milling of irregular shapes and complicated curves, there's a P&W Keller Machine just right for every work size with capacities ranging from 36" x 20" to 20 feet by 7 feet.

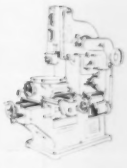
*Write now for complete information . . .*

**PRATT & WHITNEY COMPANY, INC.,**
**13 Charter Oak Blvd., West Hartford, Connecticut**









NUMERICAL CONTROL . . . JIG BORERS . . . ROTARY TABLES . . . KELLER MACHINES . . . LATHES . . . VERTICAL SHAPERS

**PRATT & WHITNEY**

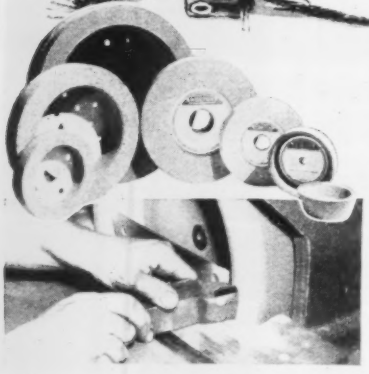
*FIRST CHOICE FOR ACCURACY*

**MACHINE TOOLS • GAGES • CUTTING TOOLS**

# *Fishing for carbide grinding economies?*

## Catch 'em all fast— with the finest lures made

**You cut grinding costs to rock bottom with Norton's outstanding wheel selection and service.**



### Norton K† Bond CRYSTOLON* WHEELS Bring Big Advantages to Offhand Grinding

Here's a combination of vitrified bond and silicon carbide abrasive that delivers remarkable results — particularly in offhand sharpening of single-point carbide tools. Wheels are made in dense, medium, or porous structure — for most efficient action regardless of the area of contact.

Also, CRYSTOLON abrasive is available in green or gray types — green, 39C, being first choice in a majority of carbide applications. And the Norton K Bond is one of the most radically improved vitrified bonds ever developed. One big advantage is: *it assures closest possible duplication of wheel specifications.* Which means that every time you reorder K Bond wheels you get exactly the same top performance.

### Norton Diamond Wheels, Mined or Man-Made . . . Carbide Grinding's Certified Crown Jewels

Norton was first to introduce all three bond types of diamond wheels: resinoid, vitrified and metal . . . does all its own checking and sizing of diamonds . . . duplicates wheel specifications with constant accuracy.

The three Norton bonds — resinoid, vitrified and metal — cover the complete range of carbide grinding requirements — from roughing to precision — including sharpening, surfacing and cutting off — on all kinds of work: single-point tools, multi-tooth cutters, form tools, dies, blanks, etc. Resinoid wheels are available in special bond types — B for wet and B6 for dry grinding.

Norton leadership in diamond wheel manufacture continues whether the diamonds used are natural or man-made. And with each Norton diamond wheel you get a certificate of diamond concentration, bearing the signature of the President of this Company.

W-1845

### The Complete Line, Completely Serviced

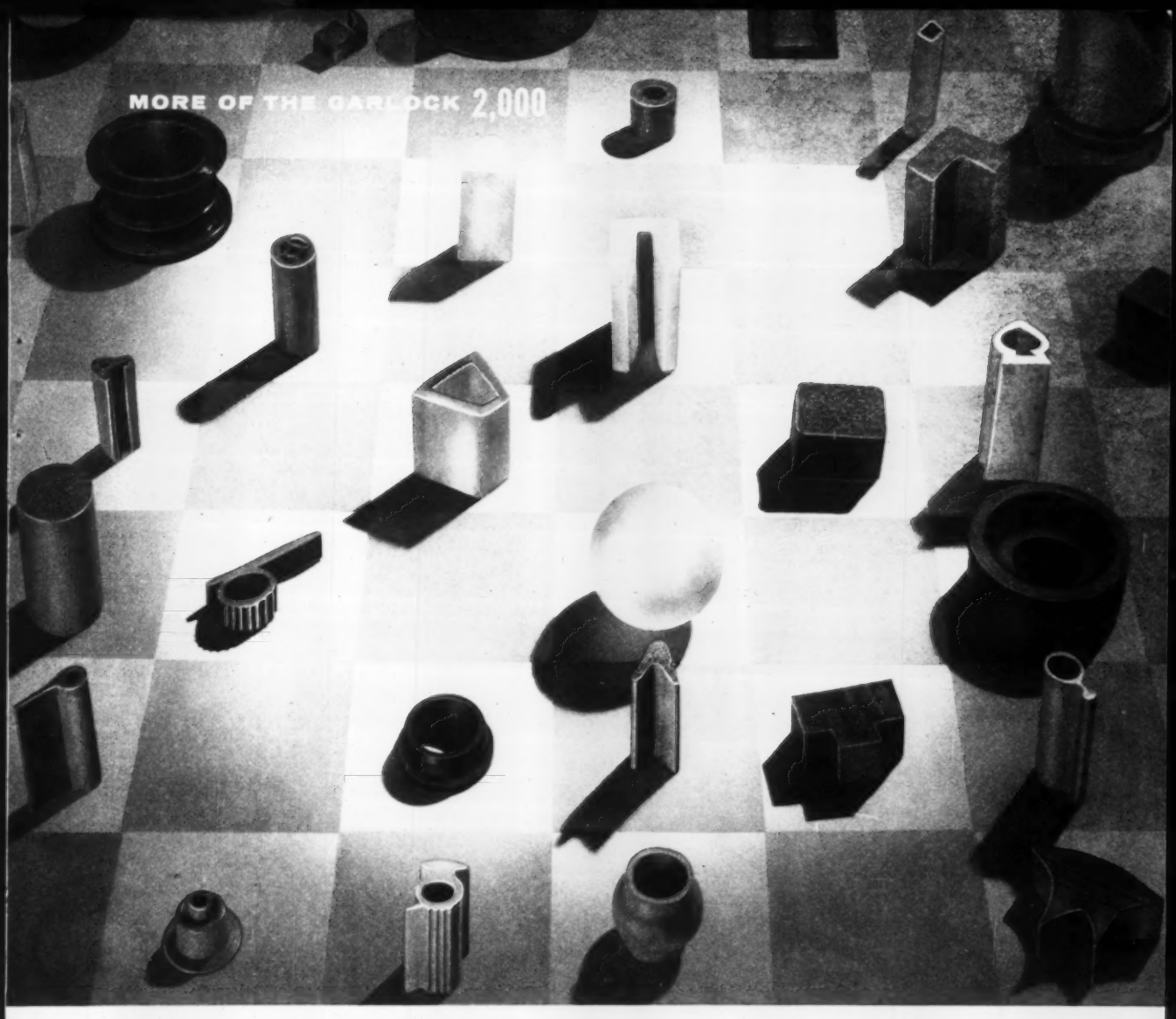
See your Norton Abrasive Engineer or Distributor for expert advice and prompt deliveries on the wheels you need for top quality, lowest cost carbide grinding. Or write to NORTON COMPANY, General Offices, Worcester 6, Massachusetts.

NORTON ABRASIVES

*Making better products . . . to make your products better*

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries †Patent applied for

**NORTON PRODUCTS** Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes




# *It's your move* ... BUT PLAY SAFE!

## SELECT GARLOCK MOLDED AND EXTRUDED RUBBER PARTS FOR ASSURED QUALITY

You can be sure of consistent high quality when you specify Garlock molded and extruded rubber parts. Why? Because Garlock has broad experience in compounding natural and all synthetic rubbers including silicone. Whether your problem involves temperature extremes, difficult liquids or gases, compression set, abrasion, or tear resistance—Garlock engineers can recommend a material and design best suited for the job. Moreover, Garlock manufacturing facilities are available for large quantity production of molded and extruded parts.

Molded and Extruded Rubber Products are another important part of "the Garlock 2,000" . . . two thousand different styles of Packings, Gaskets, and Seals for every need. The only *complete* line. That's why you get unbiased recommendations from your Garlock representative. Call him today, or write us about your needs.

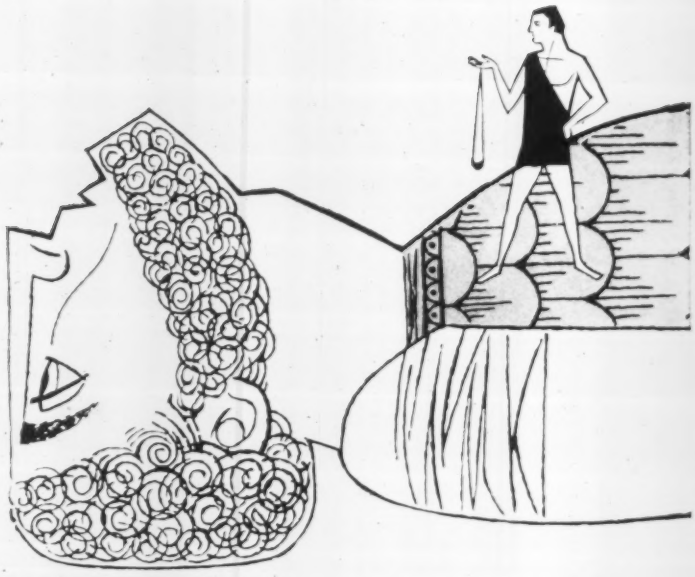
**THE GARLOCK PACKING COMPANY, Palmyra, N.Y.**

For prompt service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK

*Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products*

why use GOLIATH when "DAVE" can do the job at **1/2** the cost?

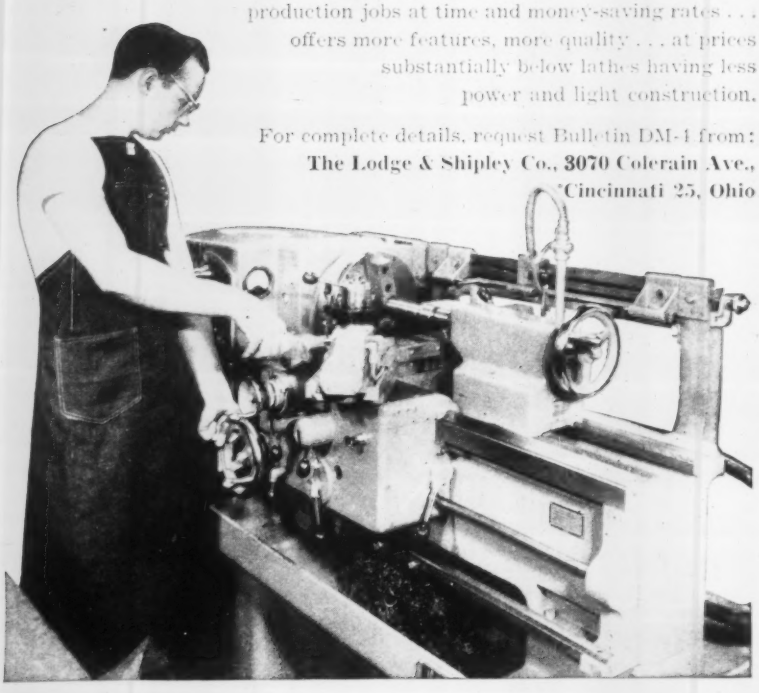


# don't pay $20,000 when you can buy a LODGE & SHIPLEY Hi-Turn COPYMATIC TRACER LATHE for less than $10,000

A too-big, too-expensive tool doesn't mean you'll do the job quicker, better or at lower cost. There's new proof of that fact . . . in the HI-TURN 45" COPYMATIC Tracer Lathe!

This rugged and versatile lathe is built to do production jobs at time and money-saving rates . . . offers more features, more quality . . . at prices substantially below lathes having less power and light construction.

For complete details, request Bulletin DM-1 from: **The Lodge & Shipley Co., 3070 Colerain Ave., Cincinnati 25, Ohio**



**"EXCELLENT FOR HIGH PRODUCTION ON SMALL PARTS,"** says Indiana Gear Works, Indianapolis

This well-known precision gear manufacturer has a number of Lodge & Shipley lathes in a busy plant. The latest is a Hi-Turn COPYMATIC, evaluated as follows:

**SPEED RANGE:**
"The wide range of speeds available on this machine is definitely an advantage."

**FEED RANGE:**
"We are able to select the correct feed for all parts run on the machine."

**DINABRAKE MOTOR:**
"Speeds production."

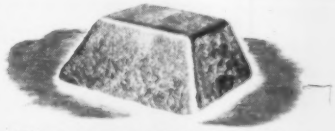
**HP AMMETER:**
"Enables the operator to run the machine at full capacity."

**DESIGN:**
"Compact, provides ease of set-up."

**ACCURACY:**
"Good."

## *"Metallic yield goes up with pig-cast ferrosilicon"*

Now steel producers can increase silicon recoveries and simplify handling operations with new pig-cast 75% ferrosilicon from ELECTROMET. The pigs provide a convenient, uniform lump size for ferrosilicon additions to steel. They produce a higher, more consistent metallic yield because fines are practically eliminated. Ready solubility is achieved because pig additions penetrate the molten steel very quickly. The uniform shape and 20- to 25-pound weight of the pigs make handling easier in both unloading and furnace operations. Your ELECTROMET representative will gladly give you further information.



Pigs are easy to handle and give a high metallic yield.

**Electromet**
FERRO-ALLOYS AND METALS

UNION CARBIDE

ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y.

The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

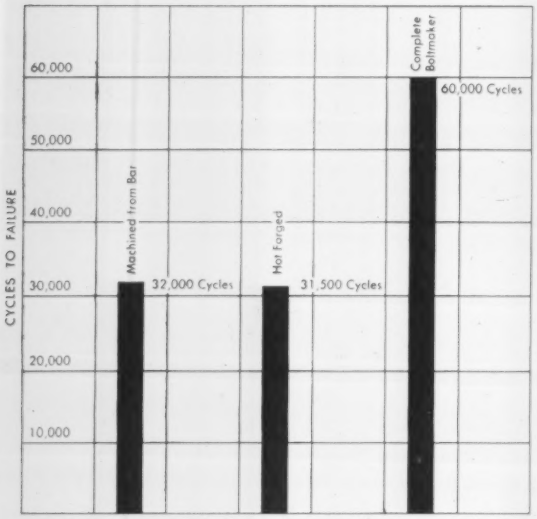
# Cleveland cold forged large diameter hex cap screws and bolts have 12.5% more tensile strength, double fatigue durability

Recent tests of large diameter hexagon head cap screws and bolts made on Cleveland's giant 1¼-in. Boltmaker definitely proved their superiority. In the tests, the screws were compared for static and dynamic properties with similar products made completely by machining from bar stock and with others made by hot forging heads and cutting threads. All test specimens were made of 1018 low carbon steel. Test results are shown below.

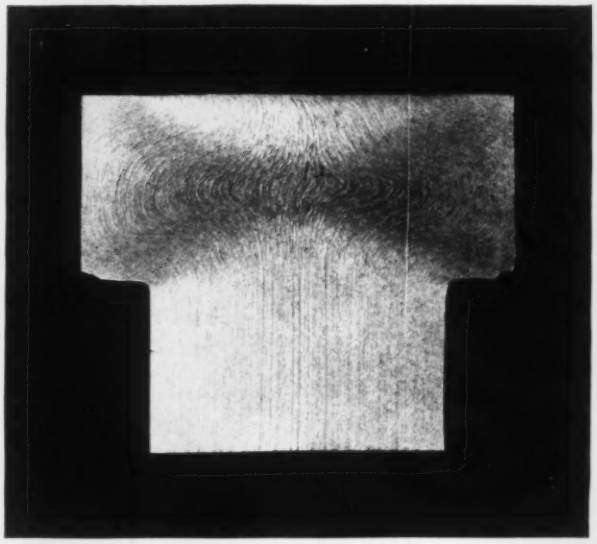
Cleveland now offers immediate delivery on a wider range of these stronger cold forged products than any other manufacturer. Large diameter hexagon head cap screws and bolts, ⅞, 1, 1⅛ and 1¼ in., up to and including 10 in. (maximum) in length, are now completely cold forged automatically on the new Boltmaker. Write today for detailed test report, samples and prices.

**STATIC TENSILE AND YIELD PROPERTIES**

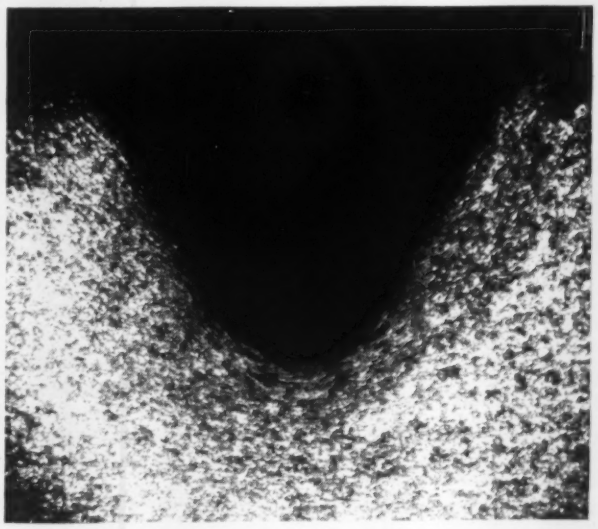
| Nature of Test | Complete on Boltmaker | Hot Forged | Machined from Bar |
|---|---|---|---|
| Ultimate tensile (lb.) | 90,000 | 74,000 | 77,500 |
| psi (tensile stress area) | 92,900 | 76,400 | 80,000 |
| Yield strength (lb.) | 77,000 | 55,000 | 69,500 |
| psi (tensile stress area) | 79,500 | 56,700 | 71,700 |
| Single shear (lb.) | 65,000 | 57,000 | 61,000 |
| psi | 53,568 | 46,975 | 50,270 |




**Dynamic fatigue properties.** Maximum alternating load induced in specimens was 53,262 lb., minimum 5325 lb. Stress computed at 50,000 psi on tensile stress area, speed 1200 cpm.



Enlarged cross section of cap screw cold forged on the 1¼-in. Boltmaker. Symmetrical, unbroken grain flow in shank-to-head area assures maximum strength.



Microphotograph of rolled thread section, showing how the grain flow follows the root radii and thread flanks. Structure increases the fatigue and tensile strength in this critical area.

**THE CLEVELAND CAP SCREW COMPANY** 4444-2 Lee Road, Cleveland 28, Ohio

WAREHOUSES: Chicago • Philadelphia • New York • Los Angeles • San Francisco

*Tubexperience in action*

# "They use this Super Alloy tubing in missiles, rockets and jets

**—so you know it can lick your heat and corrosion problems!"**

*"It's made by Superior Tube in your choice of 15 different materials. Believe me, this tubing can take the severest conditions of heat, corrosion and oxidation. Has very high fatigue and creep strength even at temperatures over 1000°F."

If you have a temperature and corrosion problem that causes failure no matter what type of tubing you have tried, get your Superior distributor to order Super Alloy tubing for you—it is the tubing for virtually every critical application of this nature.

Super Alloy tubing offers the important properties mentioned above, plus the dependability and longer service life built into it by Superior skills and experience. We will put your tubing through many special examinations if you want us to—eddy current and ultrasonic, hydrostatic, and hot tensile tests, stress rupture tests, qualitative and quantitative analysis, and many others—for your complete assurance in its ability to perform as required.

Our continuing test program on Super Alloy tubing has amassed much useful information on mechanical properties. You will want to make a study of them and their potential for use in your applications. They are covered in our Bulletin 70. Send for copies. Superior Tube Company, 2005 Germantown Ave., Norristown, Pa.

## Superior Tube

**The big name in small tubing**

**NORRISTOWN, PA.**

*All analyses .010 in. to ⅝ in. OD—certain analyses in light walls up to 2½ in. OD*

West Coast: Pacific Tube Company • 5710 Smithway St., Los Angeles 22, Calif. • RAymond 3-1331

# HEAT

1. **BRIGHT ANNEALING** furnace reduced many machining costs.

# FROM GENERAL ELECTRIC CAN CUT COST, IMPROVE QUALITY OF YOUR PRODUCT, TOO

**General Electric furnaces speed production, cut rejects, reduce maintenance costs in hundreds of processing jobs. Your decision to call G-E heat experts *now* can save you money today and for years to come.**

**Nearly any product,** like those shown at left, can be made better and at less cost through a heat processing modernization plan set up by General Electric. The savings you realize can pay off the initial cost of the system in two to three years—you get extra profits in years to come, cost-savings and a more saleable product today.

**Here are four examples** of the results achieved through the use of G-E heat processing equipment (pictured below):

1. SAVINGS OF 25 TO 50% in the manufacture of high quality stainless steel parts were realized as a result of bright annealing in General Electric furnaces in a Midwest heat treating plant. Two years of high-speed processing with virtually no maintenance and with low operating cost have resulted in high investment return and improved products.

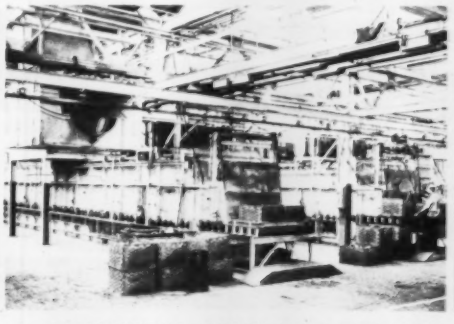
2. PICKLING WAS ELIMINATED by bright brazing stainless steel parts in a General Electric semi-continuous tubular retort furnace. Bright, shiny parts of high quality are now produced in less time, at lower cost.

3. 75% SHORTER ANNEALING CYCLES—malleable-iron annealing with automatically-controlled General Electric roller-hearth furnaces cut cycle from 4 days to 48 hours, cut man-hours 40% for a Midwest concern. Straight-line, continuous annealing boosted process rate to 32 tons of high-quality castings every day and eliminated heat-up and cool-off time formerly required by old oil-burning furnaces.

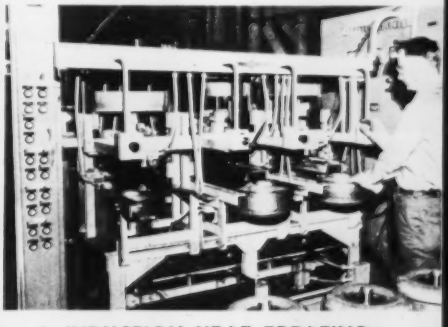
4. 300% FASTER HARDENING of transmission components is made possible by a General Electric electronic induction heater in an automotive plant. Parts enter one end, progress on rollers to the other end and are flipped over for hardening of the reverse side at the rate of one every six seconds. Higher quality products are produced.

**You can achieve results like these** with a heat modernization system planned by General Electric to fit your needs. If you suspect that obsolete heat processing equipment is robbing you of profits, call your G-E Apparatus Sales Office. A qualified Heating Specialist will quickly figure your present costs, and your potential savings. Why not call today? Section 721-11, General Electric Company, Schenectady 5, New York.

**2. BRIGHT BRAZING FURNACE** eliminated all pickling costs.



**3. CONTINUOUS ANNEALING FURNACE** cut malleable-iron annealing cycle 75%.



**4. INDUCTION HEAT TREATING** increased production by 300%.

# GENERAL ELECTRIC

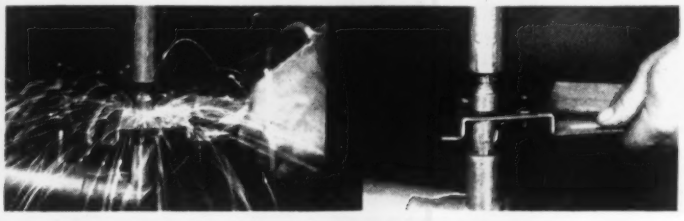
**PARKER-KALON, originators of the Self-tapping Screw,** has now developed the P-K® RIMGUARD* WELD SCREW. It has a strong, protective rim and four weld projections. Companies who have already tried the RIMGUARD tell us it is the best weld screw they've ever used.

The new rim minimizes "flash" and "spatter". Finished work is cleaner, neater—shows no burn or discoloration. And operators like the new protection. The RIMGUARD requires less current, limits the amount of pressure applied during the fusion stage, controls the flow of the fused projections, and reduces the possibility of "flower-out" or "blow-out".

Try the new P-K RIMGUARD WELD SCREW for yourself. You'll find the new 4-Projection design assures proper weld area, develops the full strength of the weld with both thin and heavy gage steels. The RIMGUARD gives better seating of the head against the work. Openings between head and work are eliminated, thus providing protection against moisture condensation and corrosion—a distinct advantage where work is to be enameled or porcelainized.

*P-K RIMGUARD* WELD SCREWS are available from your nearby Industrial Distributor in Type WS-T with projections on top the head and Type WS-U with projections under the head. Sizes or finishes other than stock items can be supplied on special order. P-K Field Engineers will be glad to help solve unusual application problems.*

Welding operation with ordinary weld screw. Note flash and spatter—a hazard to personnel and a source of discoloration.



Rimguard minimizes spatter—controls flow of fused projections—safeguards both the work and the operator.

**SOLD EVERYWHERE THROUGH INDUSTRIAL DISTRIBUTORS**

*Prompt service—In any quantity*

# PARKER-KALON® Rimguard* weld screws

**PARKER-KALON DIVISION,** General American Transportation Corporation, Clifton, New Jersey

Manufacturers of Self-tapping Screws, Socket Screws, Screwnails, Masonry Nails, Wing Nuts and Thumb Screws *Pat. Pending

it's easy
to recognize
superior
quality
**brass**
**copper**
**aluminum**
bearing this
trademark
identification

made better
to bring out the
**best** in your
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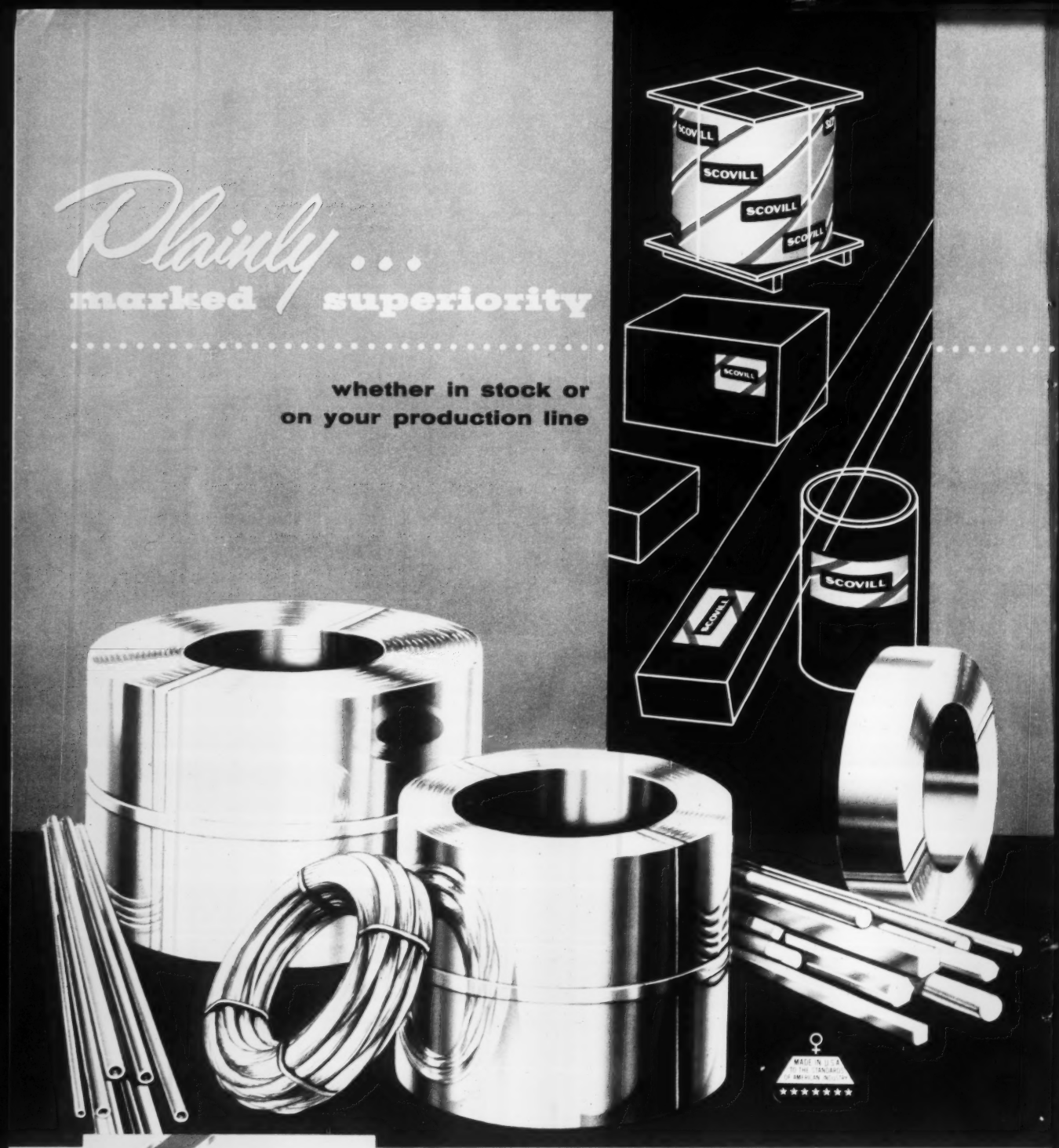



**SCOVILL**

## BRASS-COPPER-ALUMINUM

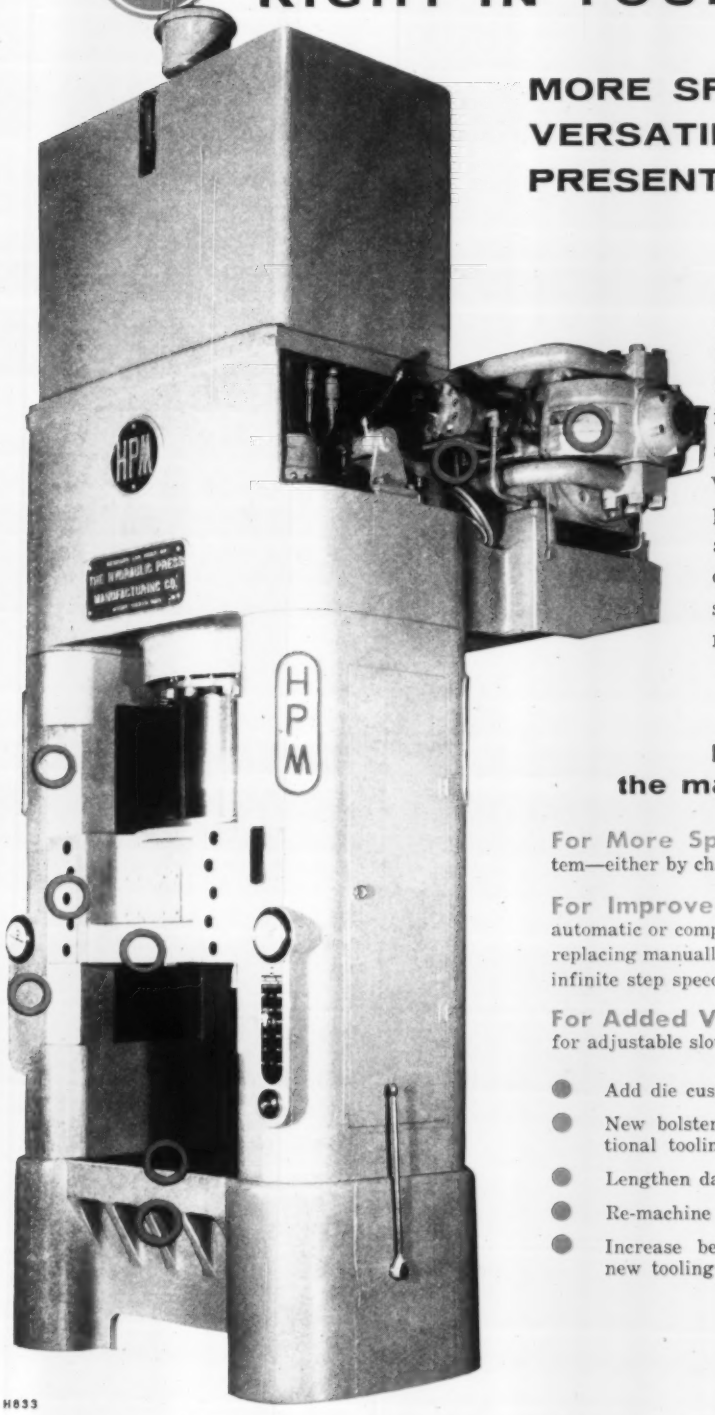
UNIFORMITY beyond the usual . . . CLOSEST control of temper and metal structure . . . EXACT dimensions consistently maintained . . . EXTRA-LONG-RUN coils of Strip or Sheet when required . . . MODERN PACKAGING for efficient handling and your protection . . . including "PAYOFFPAK" for wire.

There's a PROFITABLE difference in the way Scovill delivers these PLUS VALUES . . . order after order, lot after lot . . . made better to . . .

*bring out the BEST in your fabricated products*

Scovill Manufacturing Company, Mill Products Division, 99 Mill Street, Waterbury 20, Connecticut. Phone Plaza 4-1171.

# UPDATE—MODERNIZE
## RIGHT IN YOUR OWN PLANT




### MORE SPEED, CONTROL AND VERSATILITY FOR YOUR PRESENT H-P-M PRESS

Do you know it is possible for you to up-date your present H-P-M press right in your own plant . . . speed it up . . . improve cycle control . . . add extra versatility? Yes, we've done it many times which in most cases solved a specific production problem. Perhaps you have such a problem where a few press changes will "put you in business." If so, please contact an H-P-M press representative or call us direct.

### Listed below are the many changes possible:

**For More Speed**—Add pump capacity to your present system—either by changing pumps or by adding extra pump volume.

**For Improved Control**—Electrical systems for semi-automatic or completely full automatic control of cycling actions replacing manually operated controls. Electro-Servo systems for infinite step speed control.

**For Added Versatility**—Convert standard cycle presses for adjustable slow-down, dwell or holding cycles.

- Add die cushions for drawing or forming.
- New bolsters (sliding) for new applications or additional tooling.
- Lengthen daylight.
- Re-machine guided parts for greater accuracy.
- Increase bed size (front to back) to accommodate new tooling and larger parts handling.

H833

## THE HYDRAULIC PRESS MFG. COMPANY

A DIVISION OF KOEHRING COMPANY • MOUNT GILEAD, OHIO, U. S. A.

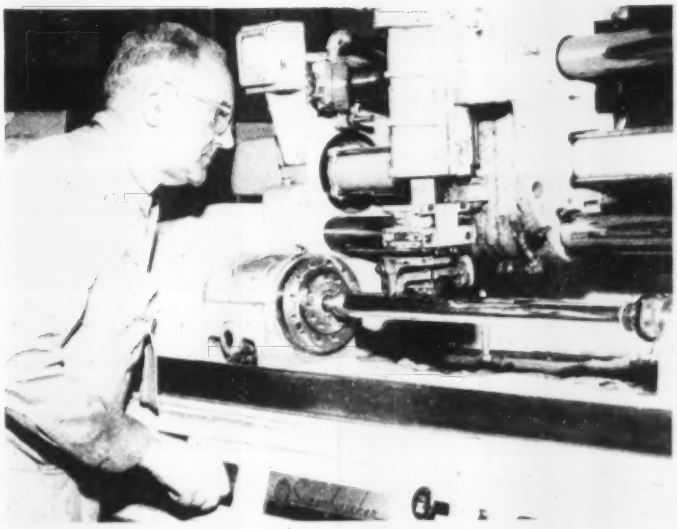
# Red Foucault grinds rolls

Louis "Red" Foucault, general foreman of the roll grinding department at Allegheny Ludlum's Wallingford Steel Co., has been a leader in the development of new roll grinding techniques for 30 odd years. Recently he has been working closely with Bay State's Fred Lee and it has really paid off for all concerned.

BAY STATE
WHEELS of PROGRESS

# BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
*In Canada:* Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
*Branch Offices:* Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh.
*Distributors:* All principal cities.



This 29½" x 2½" roll was rough-finished with a 600 grit Bay State honing stone. Here operator Lyman Tyler is giving it the final finish with the amazing 2600 grit stone on a Gisholt Superfinisher.

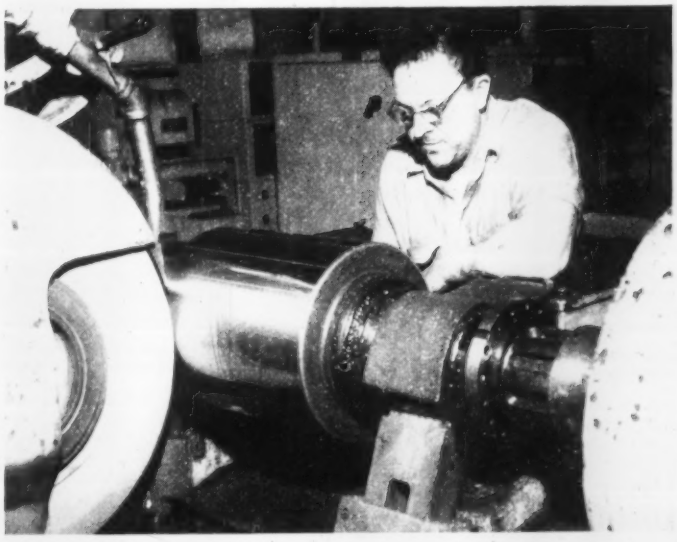
# to 50 millionths tolerance at Wallingford Steel

It's one thing to talk about millionths when you're honing a piece of steel the size of your finger. But when you want to grind 33" strip-finishing rolls more than two feet in diameter to tolerances of 50 millionths concentricity... parallel end to end ... you get into a totally different kind of grinding.

And that's exactly what Red Foucault of Wallingford Steel did get into with Fred Lee, Manager of the Bay State Bristol (Conn.) office.

Two ten thousandths had been the closest tolerance possible until Lee came up with a 2600 grit stone that had never been tried on strip-finishing rolls before. *Result:* Rolls that are 400% closer to perfect concentricity with finishes of #1RMS or under . . . a new performance record for Red Foucault . . . and the smoothest stainless steel strip (finishes as fine as #4RMS) ever produced for manufacturers of cutlery, automobiles and what have you.

You'll find your own Bay State representative ready to go to infinite pains to help solve your particular grinding problems and, like Fred Lee, not afraid to try new techniques. *Better grinding at lower cost . . . that is his business.*



In preparation for final honing operation, operator John Bakamas gets a #1RMS finish (and under) on a 13" x 13" roll with a Bay State levigated aluminum oxide resinoid bonded wheel.

## SENSITIVE, RUGGED, VERSATILE—
## TOPS FOR ALL-ROUND PRODUCTION

# THE *ALL-NEW*
# "BUFFALO" NO. 15 DRILL

The totally-new "Buffalo" No. 15 Drill combines brand new "easy-to-operate" features with the time-proven advantages earned by industry's choice for over twenty-five years.

The No. 15 has always been famous for its extreme sensitivity, which ideally suits it for small hole drilling. At the same time this versatile drill is sufficiently rigid and heavy to operate at full capacity without undue strain or wear.

New "Buffalo" No. 15 Drill Features Include:

- **Front-Mounted Start-Stop Switch.**
- **Easily-Read Speed Range Table.**
- **Graduated Depth Gauge.**
- **Proper Belt Tension is Automatically Maintained.**
- **Belt Guard Tilts Upward to Simplify Speed Changes.**

All these and many more notable improvements are yours with the new "Buffalo" No. 15 Drill. The No. 15 line includes bench, floor and pedestal models. Bench and pedestal types are available in 1- to 6-spindle models. Attachments for tapping, mortising, routing or spot-facing may be ordered.

Your nearby "Buffalo" machine tool dealer will be glad to arrange a demonstration of the No. 15 Drill. Contact him today, or write us direct for Bulletin No. 4024.

*"Buffalo" products bring you the famous "Q" Factor — the built-in QUALITY which provides trouble-free satisfaction and long life.*

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

**BUFFALO FORGE COMPANY**

**158 Mortimer • Buffalo, N. Y.**

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING BENDING

# BUILT BIG . . . TO CLEAN BIG

## Giant Pangborn unit Rotoblasts loads up to 12,000 lbs. in minutes!

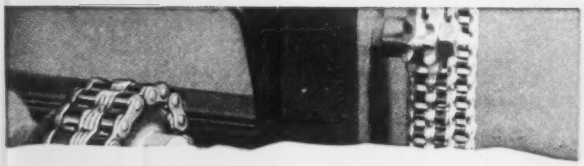
A side view of the 72 cu. ft. Pangborn Rotoblast Barrel. Pangborn Barrels available in 1½, 3, 6, 12, 18, 20, 32, 72 and 102 cubic foot sizes

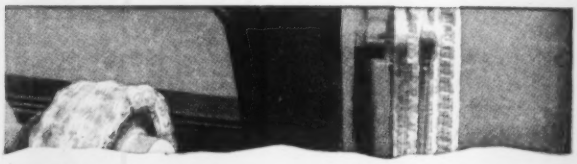
How do you build a giant blast cleaning barrel? If you're Pangborn, you use steel, inches thick. You put in the heaviest apron conveyor ever made. You incorporate the patented abrasive separator, abrasive-tight door, simplified Pangborn construction. You power it with two Rotoblast wheels that hurl *60 tons of abrasive an hour.*

Sure, it's tough to build . . . but it's worth it when you come up with a 72 cu. ft. Pangborn Rotoblast® Barrel! This unit cleans 6-ton loads *in five minutes* and gives the lowest operating and maintenance costs in the blast cleaning field! It's one of many Pangborn Rotoblast Machines. There's one for *your* problem.

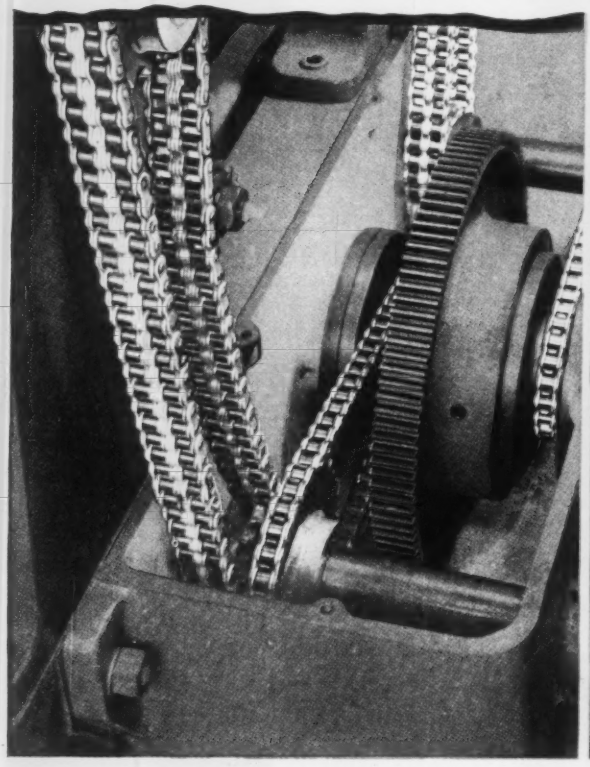
*The Pangborn Engineer in your area will be glad to take off his coat and go to work on your cleaning problem at no obligation. And for complete information on Rotoblast Barrels, write to:* Pangborn Corp., *1600 Pangborn Blvd., Hagerstown, Md. Manufacturers of Blast Cleaning & Dust Control Equipment.*

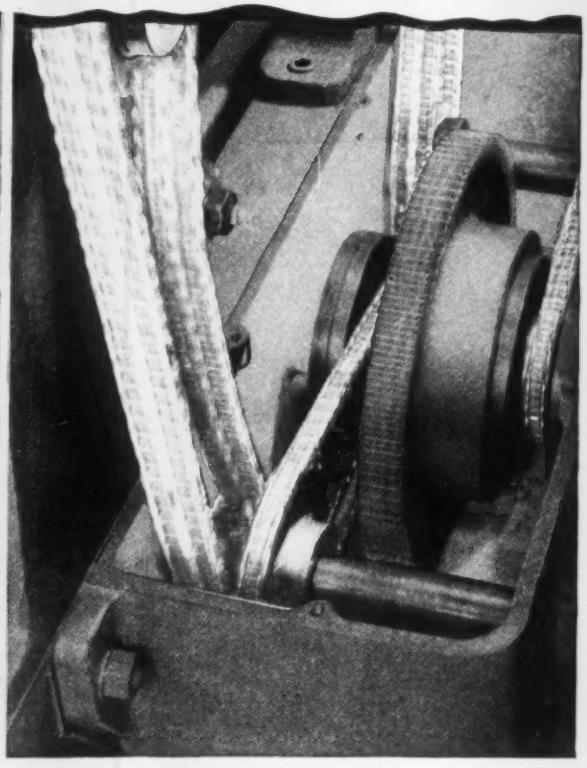
Clean it fast with **Pangborn ROTOBLAST®**





## To static strength . . . add *dynamic strength*





**RESISTANCE TO TENSILE STRESS** is achieved with properly heat-treated, accurately machined side bars made of premium steel and fitted with properly hardened pins, bushings, rollers.

**STRENGTH OF CHAIN IN MOTION** results from such refinements as pitch-hole preparation, micro-finish of parts, special processing of side bars, pre-lubrication, rigid quality control.

# Why LINK-BELT roller chain takes stresses in stride

ON *tough-service* drives and conveyors, Link-Belt precision steel roller chain consistently delivers longer life. That's because its *greater dynamic strength* withstands the starting shock and centrifugal loads of severe operation.

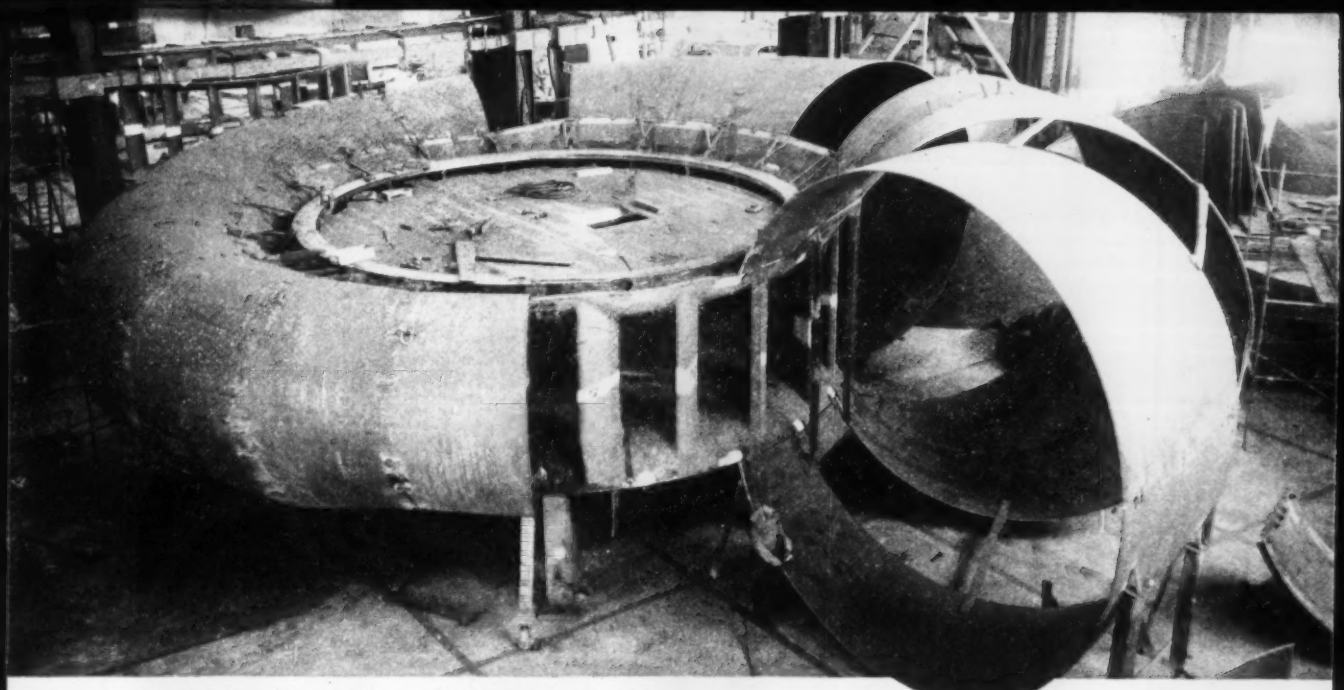
Reports from users prove the effectiveness of Link-Belt's manufacturing extras that add to greater dynamic strength. Shot-peened rollers give greater fatigue life and ability to withstand impact . . . lock-type bushings end a common cause of chain stiffness . . . pre-stressing provides uniform load distribution . . . closer heat-treat control insures uniformity.

For facts, see your nearby Link-Belt office or authorized stock-carrying distributor. 14,643

**LINK-BELT**

**ROLLER CHAIN AND SPROCKETS**

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 15); Australia, Marrickville, N. S. W.; South Africa, Springs. Representatives Throughout the World.



**Turbine spiral case** being fabricated of USS "T-1" Steel in the shop of the S. Morgan Smith Co., York, Pa. Plates ranged in thickness from ½" to 1 15/16".

# Taming the mighty Snake River with turbine spiral cases of USS "T-1" Steel

## Stronger steel reduces weight . . . cuts costs

**Four of these** huge spiral cases are being built for the Idaho Power Company for use in the Brownlee Dam on the Snake River near Robinette, Oregon. They are designed for a 250-foot head of water. The inlet is 18 feet in diameter and each turbine will generate 144,000 horsepower at a speed of 128.6 rpm. Water will flow through the cases at a rate of 5,460 cubic feet per second.

Because of the fierce pressure, it was obvious that a strong steel was required. USS "T-1"* Steel was selected because it has a minimum yield strength of 90,000 psi. What's more, it can be fabricated, is readily weldable and has high resistance to impact abrasion.

**Cost savings.** By using USS* "T-1" Steel, there will be substantially less shipping weight across the country and less weld time and weld metal, both in the shop and on the job site. Had carbon steel been specified, double thicknesses would have been required.

**Fabricating operations.** Projection of the dimensional outline on the plates was done with Lumitrace. Plates were cut to size by flame-cutting and rolled cold to shape. Some parts were finish welded, others were tack welded and assembled. The spiral case was then disassembled and shipped. Finish welding of segments is to be done at the dam site.

This job points up the economies possible with the use of USS "T-1" Steel. Why not use it for your own equipment? Write for our "T-1" book containing complete information. United States Steel Corporation, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

Remember that we also make USS COR-TEN*, USS TRI-TEN* and USS MAN-TEN* Steels . . . widely used in power generation equipment.

United States Steel Corporation – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
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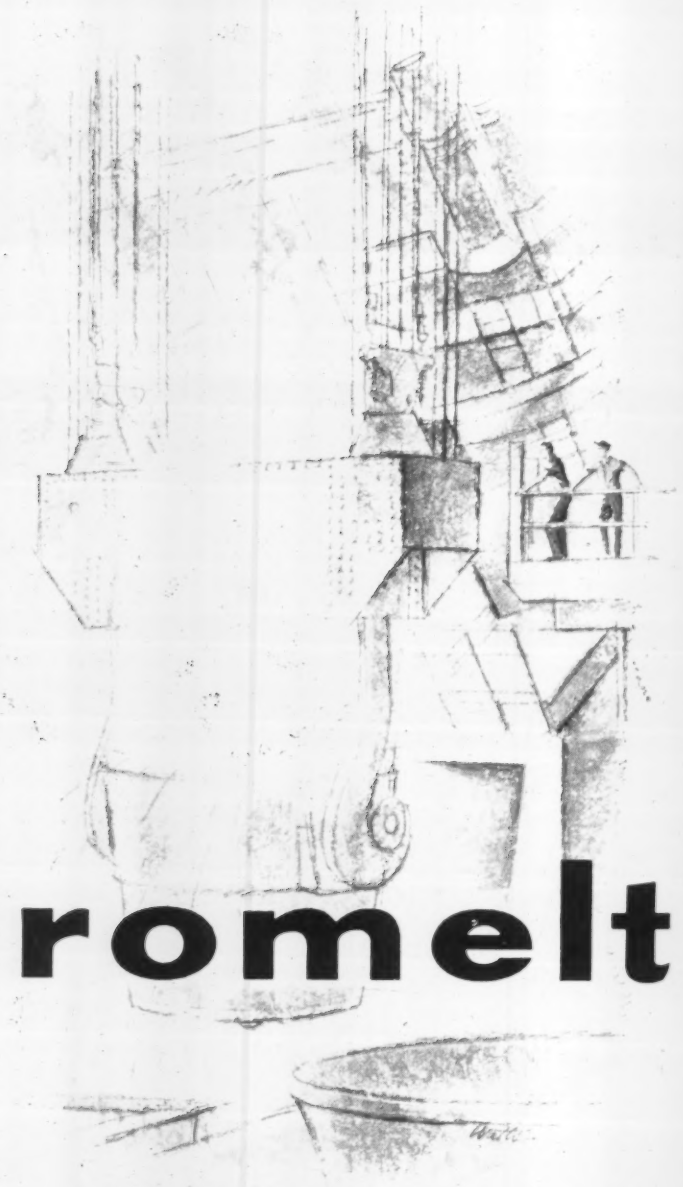
USS United States Steel

*REG. U.S. PAT. OFF.



When you melt...

# Lectromelt*

McGRAW EDISON

*In the United States*

**Lectromelt Furnace Division, McGraw-Edison Company**
*323 32nd Street, Pittsburgh 30, Pennsylvania.*

*and around the World*

**Forni Stein**—*Genova, Italy*
**Canefco Limited**—*Toronto, Canada*
**Electric Furnace Company, Ltd.**—*Weybridge, England*
**Demag-Elektrometallurgie, GmbH**—*Duisburg, Germany*
**General Electrica Espanola**—*Bilbao, Spain*
**Stein et Roubaix**—*Paris, France*
**S. A. Stein & Roubaix**—*Bressoux-Liege, Belgium*
**Daido Steel Co. Ltd.**—*Nagoya, Japan*

Catalog 10 describes efficient, time-proven Lectromelt furnaces and equipment.

**The Year's Profit-laden Production Opportunity**

# 3rd National Coated Abrasive Machinery Show

- The World's Largest All Coated Abrasive Machinery Show.
- A Working Show — All Equipment Running.
- Bring Your Parts — Bring Your Polishers.
- Hundreds of New Machines to Service.
- Evaluate 1959 Production Plans.

Don't Miss It!

# The World's Largest

## At Behr-Manning Co. in Troy,

## See the latest coated abrasive machines and methods

Here is the production opportunity of a lifetime. In one place and one time, **all** the leading machinery manufacturers will be demonstrating their newest grinding and polishing equipment. Every type of coated abrasive machine will be there **for your use**. This show is new, it's big, it's timely — **it's different!**

Different? Indeed it is! You actually **bring your parts** and test them on any or all these newest of coated abrasive machines. Right on the show floor.

You can't afford to pass this show up! Plan now to attend. The time — June 10 thru June 13, 1958; the place — Behr-Manning's new Product Engineering Building, Troy, New York; the opportunity — to learn how **you can achieve** improved finish, increased production and greater economies on **your particular operation.**

## Join this interesting Abrasive Tech course at the Machinery Show

**How to choose industrial coated abrasives.**
**You'll learn the advantages of different coated abrasives, and how the grain, bond and backing affect a product's performance at this special course just off the show floor.**

# Coated Abrasive Machinery Show

## *New York • June 10 through June 13, 1958*

Attend the Premiere
of our new
Coated Abrasive film

**BETTER OFFHAND POLISHING**

**See Behr-Manning's newest motion pictures, filmed in plants across the country. See the practical use of jigs and holding fixtures and innumerable cost saving application. Filmed in full color and sound.**

**Theory and application of abrasive machinery.**
**The principles of coated abrasive machine tools, and how to apply to woodworking, metalworking will be explained by experienced engineers.**

**Demonstration of abrasive products.**
**To round out the course, application demonstrations of proper polishing techniques will be shown. Mark the dates on your calendar now.**

*Equipment from these Machinery Manufacturers will be demonstrated at the*

# 3rd NATIONAL COATED ABRASIVE MACHINERY SHOW

ABRASIVE MACHINERY, INC.
Oneida, N. Y.

ABRASIVE MACHINERY CORP.
Indianapolis, Ind.

ACME MANUFACTURING CO.
Detroit, Mich.

AULSON TANNING MACHINE CO.
Beverly, Mass.

ARO EQUIPMENT CO.
Bryan, Ohio

STEPHEN BADER & CO.
Valley Falls, N. Y.

BEACH MANUFACTURING CO.
Montrose, Pa.

BLACK & DECKER MFG., CO.
Towson, Md.

BOICE-CRANE CO.
Toledo, Ohio

BUCKEYE TOOL CORP.
Dayton, Ohio

BRUNSWICK MACHINE TOOL CORP.
Eagle Mills, Troy, N. Y.

BUSH MANUFACTURING CO.
Clawson, Mich.

CHICAGO RUBBER CO.
Waukegan, Ill.

CINCINNATI ELECTRIC TOOL CO.
Cincinnati, Ohio

F. L. & J. C. CODMAN CO.
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CURTIN-HEBERT CO., INC.
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DIVINE BROTHERS CO.
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EKSTROM-CARLSON CO.
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ENGELBERG-HULLER CO., INC.
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FORMAX MFG. CO.
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GRINDING & POLISHING MACHINE CORP.
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HAMMOND MACHINERY BUILDERS, INC.
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HARTFORD SPECIAL MACHINERY CO.
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R. G. HASKINS, CO.
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HILL-ACME CO.
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INDUSTRIAL FILTRATION CO.
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CHARLES JARVIS CO.
Middletown, Conn.

KEARSARGE ENGINEERING CORP.
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MALL TOOL CO.
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MATTISON MACHINE WORKS
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MURDOCK MACHINES
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MURRAY-WAY CORP.
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NU-MATIC GRINDERS, INC.
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PRODUCTION MACHINE CO.
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ROCKWELL MFG. CO.
Delta Power Tool Division
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RYMAN ENGINEERING CO.
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STANDARD ELECTRIC TOOL CO.
Cincinnati, Ohio

SHERRILL MACHINE CO.
Statesville, N. C.

STANLEY ELECTRIC TOOLS
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D. A. STUART OIL CO.
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SUNDSTRAND MACHINE TOOL CO.
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THOR POWER TOOL
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WATERVLIET TOOL CO.
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YATES-AMERICAN MACHINE CO.
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**Bring Parts !**

**Come See !**

**Bring your Polishers!**

**BEHR-MANNING CO.**

**TROY, N. Y.**

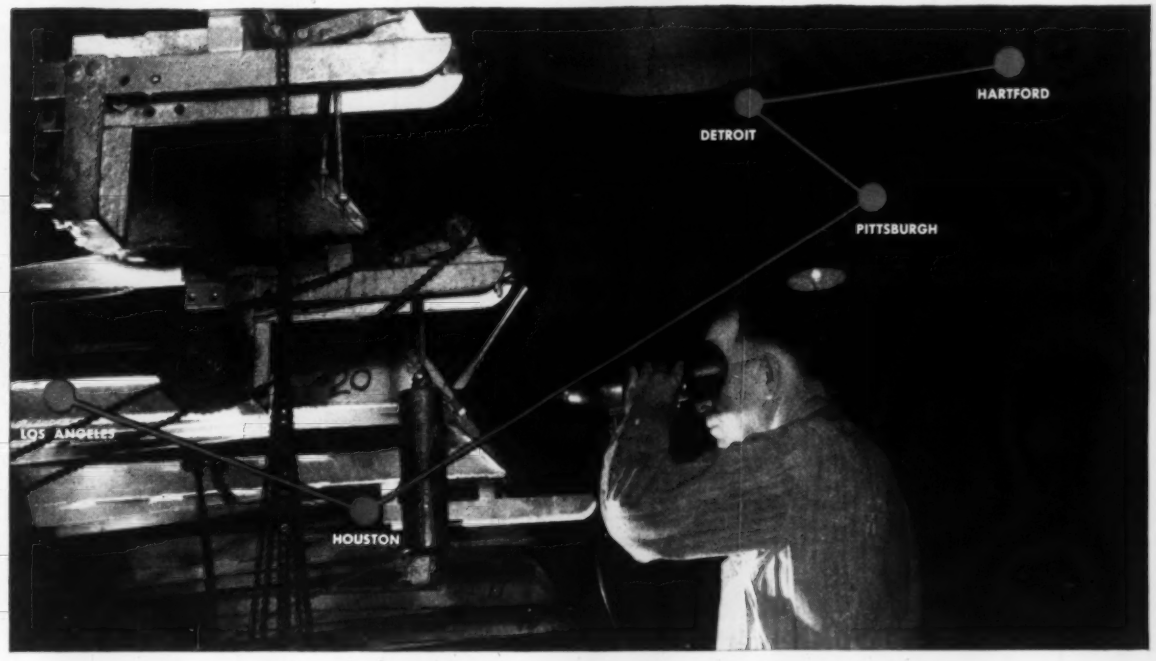
The Year's Profit-laden Production Opportunity

**3rd National**
**COATED ABRASIVE MACHINERY SHOW**
**Troy, New York**

June 10 thru June 13 11 A.M. thru 7 P.M.

# Firth Sterling ...

PIONEER IN POWDER AND MOLTEN METALLURGY




## UNIQUE NATION-WIDE SINTERING PLANT NETWORK PROVIDES FAST SERVICE ON CARBIDES

Firth Sterling was the first carbide manufacturer to set up sintering facilities at its branch warehouses . . . now has a network of five such plants strategically located to provide on-the-spot service to tool fabricators in the metalworking centers across the nation.

This local service on semi-standard and special carbide shapes, coupled with the broad selection of standard carbides in the Firthite line and the metallurgical skill developed in 30 years of experience with carbide tooling problems, make Firth Sterling a logical source for practical help with carbide applications.

Call your nearest Firth Sterling representative or distributor for specific information on how the sintering facilities can serve you on special tooling problems. Standard carbides, high speed steels and tool and die steels are also available promptly from Firth Sterling's warehouse and distributor stocks.

* * *

Expansion of sintering facilities is another example of Firth Sterling leadership in meeting requirements of the metalworking industry. If you have a metallurgical problem, powder or molten, we are sure we can help you solve it. Please let us hear from you.

### FREE Carbide Technical Manual

*If you use carbide tips, tools, or dies, you'll find the new Firth Sterling Carbide Technical Manual a valuable source of information. Write for your copy today.* Firth Sterling, Inc., Dept. 82E, 3113 Forbes Street, Pittsburgh 30, Pa. Offices and warehouses in principal cities.

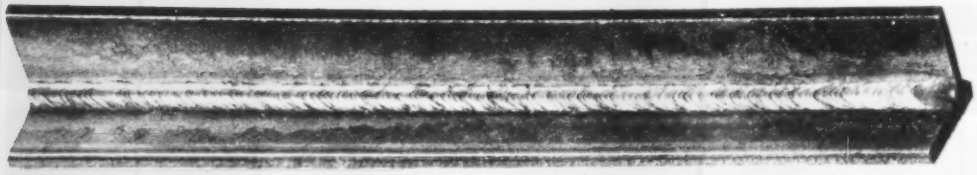
PRODUCTS OF Firth Sterling METALLURGY

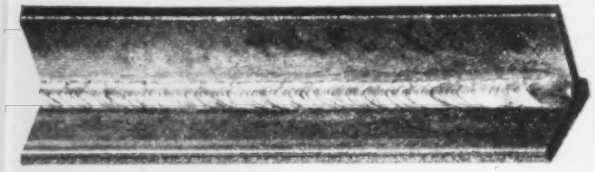
HIGH SPEED STEELS • TOOL & DIE STEELS • STAINLESS SPECIALTIES • HIGH TEMPERATURE ALLOYS
SINTERED TUNGSTEN CARBIDES • HEAVY METAL • CERMETS • CHROMIUM CARBIDES
ZIRCONIUM • TITANIUM • STERVAC & STERCON SUPER ALLOYS

FIRTH STERLING TRADE MARK

*Now . . . another dramatic advance in electrodes*

*from* **AIR REDUCTION . . .**





***Over 90% Bonus!***

**This** is the extra weld per rod you get with the new Airco Easyarc Stainless steel electrode

**This** is what you get with the conventional electrode

# A NEW LOW-COST ELECTRODE FOR STAINLESS STEEL

*New Airco Easyarc stainless steel electrodes produce over 90% more weld per rod . . . actually cost 29% less per pound than conventional stainless steel electrodes!*

The new Airco Easyarc stainless steel electrodes are the first powdered-metal electrodes for stainless steel ever offered! They make possible *tremendous savings*, opening up possibilities for stainless use in many *new applications*.

You can weld practically *any* type of stainless steel with the new series. They are available as Easyarc 308, 316, or 347, the designations being equivalent to the type of stainless they weld. Restriking is instantaneous. Available in sizes from 3/32" to 3/16".

Order the new Easyarc stainless steel electrodes from your nearest Authorized Airco Dealer. Look for his name in the classified section of the telephone book under "Welding equipment and supplies." Or call your nearest Airco office.

*Sample . . .* **Airco will be glad to mail you sample Easyarc Stainless Steel Electrodes — enough for an on-the-job trial. Write to Airco today!**

AIRCO®

Offices and dealers in most principal cities

**AIR REDUCTION SALES COMPANY**

A division of Air Reduction Company, Incorporated
150 East 42nd Street, New York 17, N. Y.

On the west coast — Air Reduction Pacific Company
Internationally — Airco Company International
In Cuba — Cuban Air Products Corporation
In Canada — Air Reduction Canada Limited
All divisions or subsidiaries of Air Reduction Company, Inc.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT • Products of the divisions of Air Reduction Company, Incorporated, include: AIRCO — industrial gases, welding and cutting equipment, and acetylenic chemicals • PURECO — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipe line acetylene and calcium carbide • COLTON — polyvinyl acetate, alcohols, and other synthetic resins.

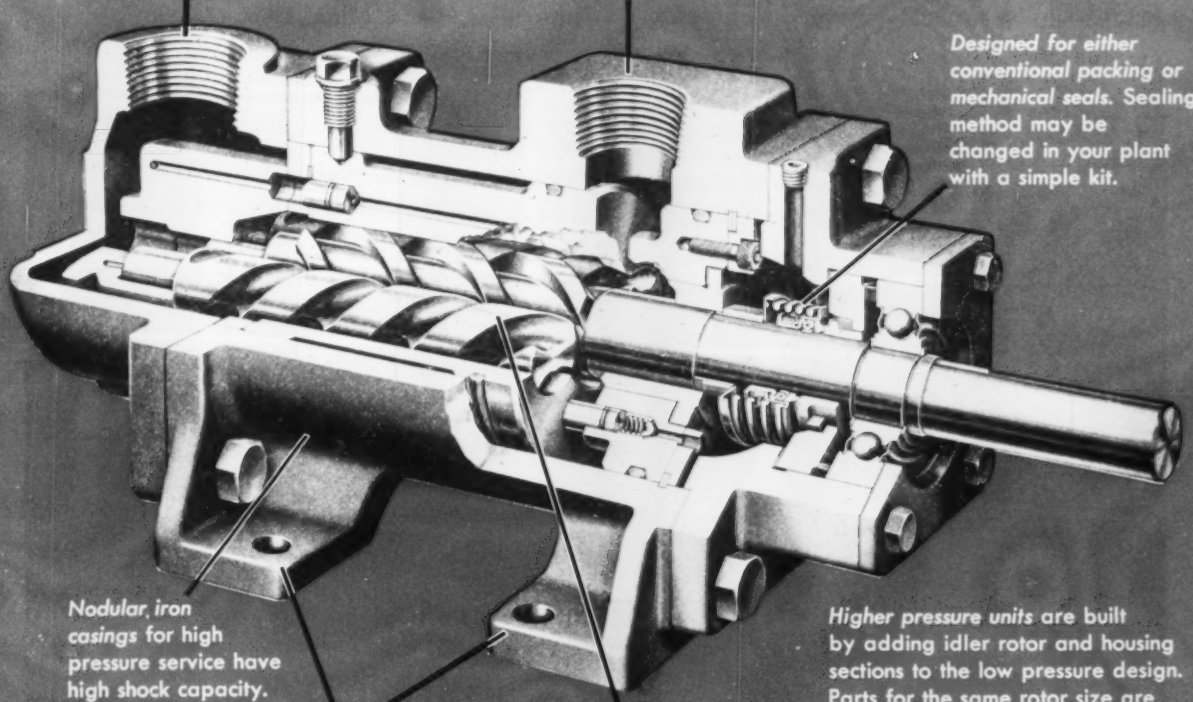
# DE LAVAL IMO PUMPS

## *are now more versatile than ever*

De Laval IMO pumps have proved that they do a dependable job over long years of service. The reason is IMO design simplicity. These constant displacement rotary pumps have only three moving parts—smoothly intermeshing rotors that propel the fluid axially in a steady flow without churning, pocketing or pulsation. There are no timing gears, cams, valves, sliding vanes, or reciprocating parts to wear or become noisy. *Quiet*, compact IMO pumps are excellent for direct-connected, high-speed operation.

*In addition to these basic pumping advantages, the improved IMO gives you important new benefits shown in the cutaway illustration below.*

**DE LAVAL IMO PUMPS can also be used as hydraulic motors.**



*Inlet can be rotated* to suit installation arrangement.

*Discharge flanges* are infinitely varied. You can use the most advantageous piping method to suit installation requirements.

*Designed for either conventional packing or mechanical seals.* Sealing method may be changed in your plant with a simple kit.

*Nodular iron casings* for high pressure service have high shock capacity.

*Any position mounting* is possible without factory modification.

*Higher pressure units* are built by adding idler rotor and housing sections to the low pressure design. Parts for the same rotor size are interchangeable over the entire pressure range.

*Internal parts are designed as a package* so that units can be built into your machines.

*Bulletin 3001 gives data on improved De Laval IMO pumps. Send for your copy today.*

**DE LAVAL** *IMO Pumps*

DE LAVAL STEAM TURBINE COMPANY

*860 Nottingham Way, Trenton 2, New Jersey*

DL 415

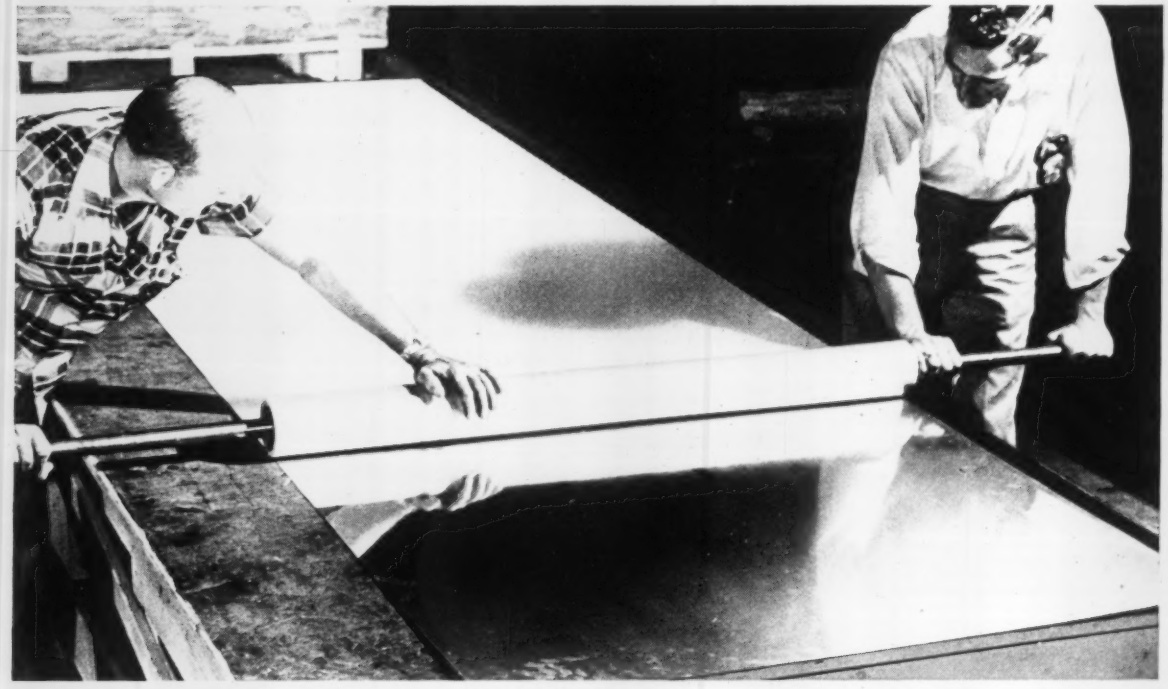
*Another industrial need filled by 3M laboratories . . .*

# This "SCOTCH" Brand Tape shrugs off scratches!

Here's positive protection for polished and finished sheet material such as stainless steel, aluminum, and other fine-finished surfaces. You know how such surfaces seem to *attract* scratches and marring! "SCOTCH" Brand Protective Tape No. 343 is now providing "pennies a day" protection for producers and fabricators using these materials.

A thin, tough, pliable paper backing, combined with an elastic, high film-strength adhesive, "SCOTCH" Brand Protective Tape resists abrasion and pressure—can actually be used to protect materials during die stamping and forming operations. The backing is smooth . . . pattern layouts can be marked on tape to aid cutting and fabricating. It is easy to apply; easy to remove. "SCOTCH" Brand Protective Tape No. 343 is one example of the many specialized pressure-sensitive tapes in the world's most complete line. Ask your local "SCOTCH" Brand Tape distributor for further information, or write us direct. Address: Minnesota Mining and Manufacturing Company, St. Paul 6, Minn., Dept. GK-58.

"SCOTCH" is a registered trademark of 3M Co., St. Paul 6, Minn.



*When tape costs so little, why take less than . . .*

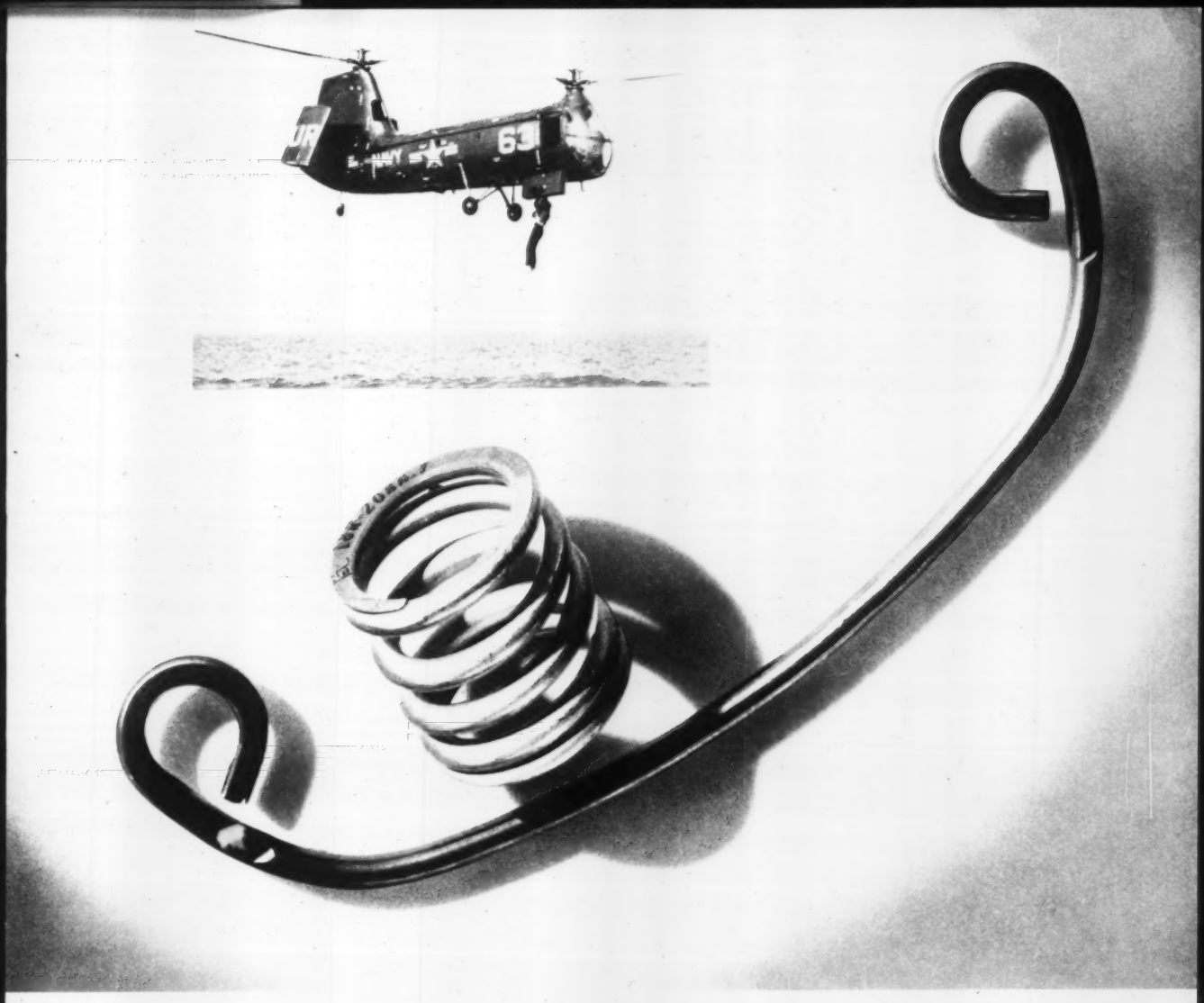
REG. U.S. PAT. OFF.

**SCOTCH BRAND Protective Tapes**

**MINNESOTA MINING AND MANUFACTURING COMPANY**

**. . . WHERE RESEARCH IS THE KEY TO TOMORROW**

3M COMPANY



# Up with the Whirlybirds . . .

What helps this helicopter hover? It's an engineering principle — angle of tilt of rotor blades and speed of revolution. What's at the heart of the rotor assembly? Among other things, this rugged spring and tension bar made by an A.S.C. Division. The same exacting "aircraft quality" that produces these and hundreds of other high duty aircraft springs is available to manufacturers in any industry whose standards demand the best.

Write for a copy of "How to Solve Your Spring Design Problems" to learn how early consultation with the spring manufacturer results in improved design and performance.

## Associated Spring Corporation

**General Offices: Bristol, Connecticut**

Wallace Barnes Division, Bristol, Conn. and Syracuse, N. Y.
B-G-R Division, Plymouth and Ann Arbor, Mich.
Seaboard Pacific Division, Gardena, Calif.
Cleveland Sales Office, Cleveland, Ohio
Raymond Manufacturing Division, Corry, Penna.
Ohio Division, Dayton, Ohio
F. N. Manross and Sons Division, Bristol, Conn.
San Francisco Sales Office, Saratoga, Calif.
William D. Gibson Division, Chicago 14, Ill.
Milwaukee Division, Milwaukee, Wis.
Dunbar Brothers Division, Bristol, Conn.
Wallace Barnes Steel Division, Bristol, Conn.
Canadian Subsidiary: The Wallace Barnes Co., Ltd., Hamilton, Ontario and Montreal, Quebec

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# Bargain Priced Over The Long-Term Haul!

**When low cost is a factor you'll want the extras in a...**

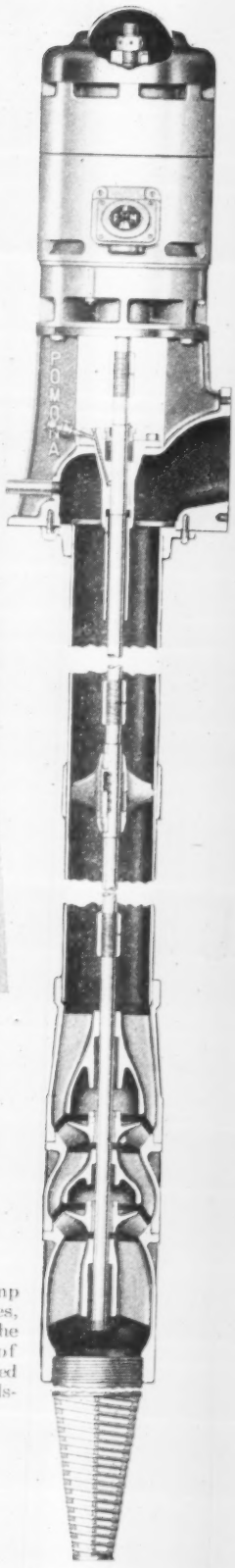
## Fairbanks-Morse Water Lubricated Pomona Turbine Pump

Low price is only the beginning with this rugged turbine pump. Fairbanks-Morse built-in features keep annual costs even lower by providing longer, trouble-free performance; simplified maintenance; greater flexibility.

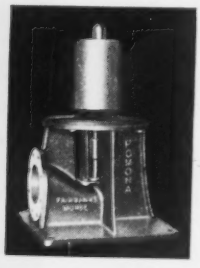
Here are just a few of the features that make the F-M Pomona Pump such an outstanding investment for your deep well water supply:

- Water lubrication. Packing box, impeller adjustments above ground; can be reached without interrupting pump service
- Two piece head shaft facilitates installation and service
- Stilling tube keeps suspended material out of packing box
- Special bearings, bearing retainers and pump bowls designed for maximum efficiency and long life

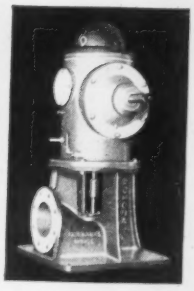
Contact your F-M Pomona Dealer or Fairbanks-Morse Sales Engineer today. Ask for new illustrated Bulletin 6957-1. Or write Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.



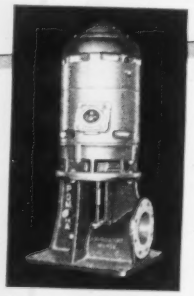

**So Easy To Change Drives...**




BELTED



GEARED



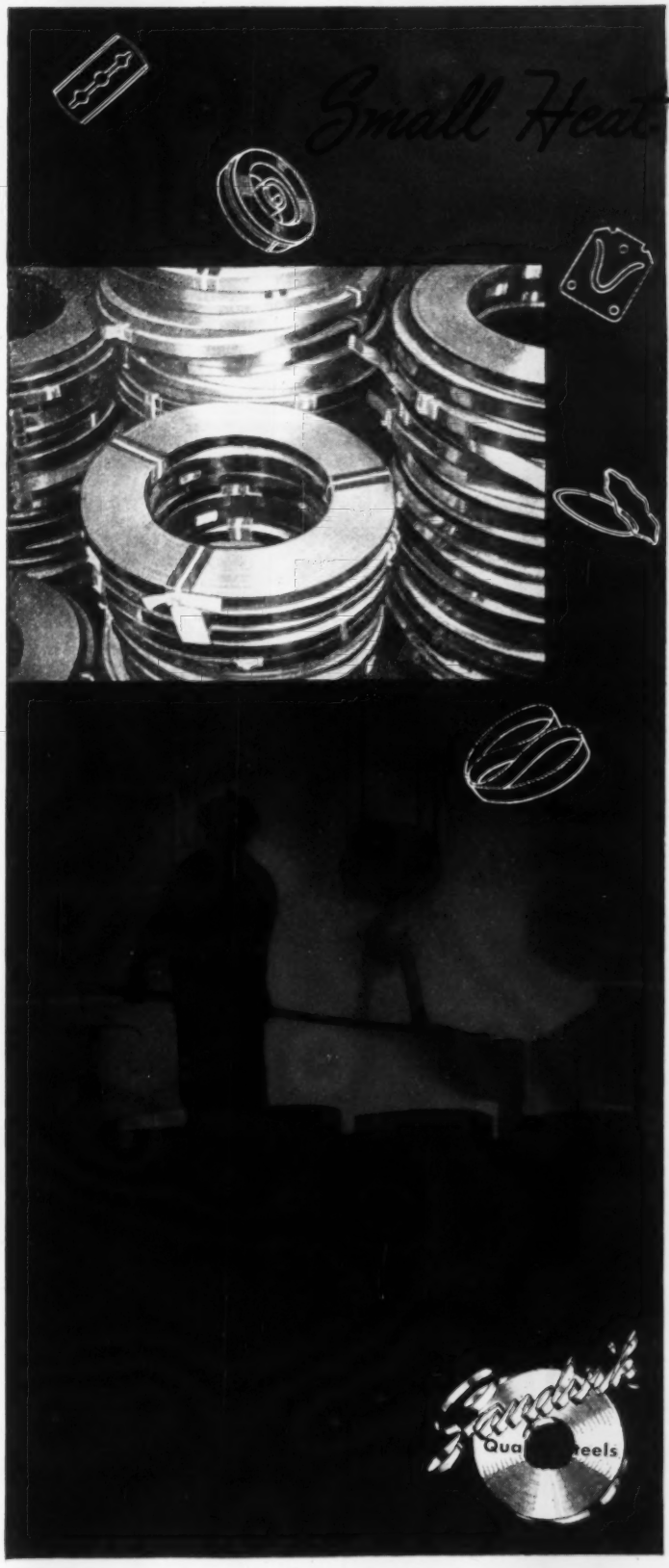
ELECTRIC

Seven Fairbanks-Morse pump factories in the United States, Canada and Mexico build the world's greatest variety of hydraulic combinations offered by any manufacturer of liquids-moving machinery.

**FAIRBANKS-MORSE**

*a name worth remembering when you want the BEST*

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS



*Small Heat Production*

is behind

# SANDVIK

## SPRING STEEL'S

## successful performance

Sandvik specialty steels are carefully produced in relatively small quantities which facilitate closer control and uniform results.

Pure Swedish ore and coniferous, sulphur-free fuel are used to produce pig iron of unusually high quality. Sandvik's small blast furnaces and steel furnaces afford closer control of the quality of each heat.

In the subsequent rolling and annealing operations, Sandvik applies its specialized experience, skill and equipment, — "tailoring" the steel to the precise gauge, hardness and surface finish required.

The final result is the inherent quality which has made Sandvik spring steel successful in so many exacting applications.

***You can get Sandvik strip steels:***

- **In special analyses for specific applications.**
- **Precision-rolled in thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered.**
- **Polished bright, yellow or blue.**
- **With square, round or dressed edges.**
- **Wide range of sizes in stock — also slitting facilities available.**

*Ask your nearest Sandvik office for further information or technical assistance.*

**Sandvik Swedish Specialty Strip Steels are used for Textile Machine Parts such as sinkers, needles, etc. • Band Saws (metal, wood and butcher) • Camera Shutters • Clock and Watch Springs • Compressor Valves • Doctor Blades • Feeler Gauges • Knives such as cigarette knives, surgical, etc. • Razor Blades • Shock Absorbers • A Wide Variety of Springs • Trowels • Reeds: Vibrator, Textile, etc. • Piston Ring Segment and Expanders • and many other applications.**

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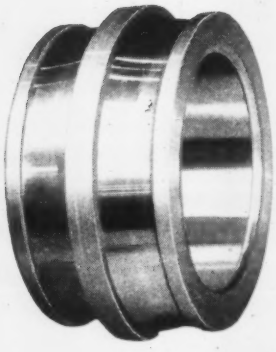
# SKF RACES *Against Time...*



*with the*

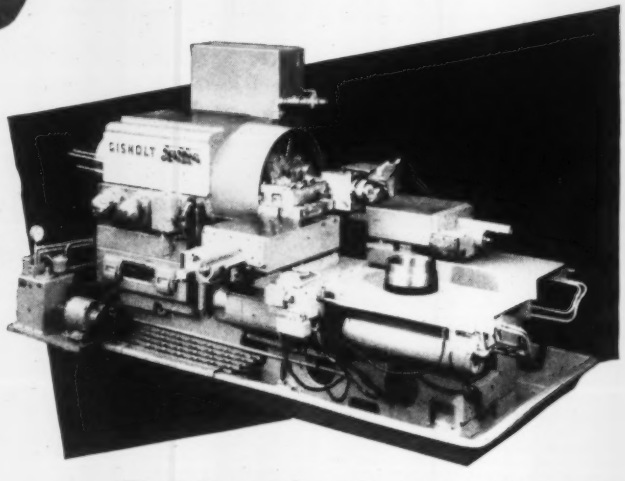
## GISHOLT NO. 24 HYDRAULIC AUTOMATIC LATHE

When it comes to fast production of top quality spherical roller bearing races, SKF doesn't fool.

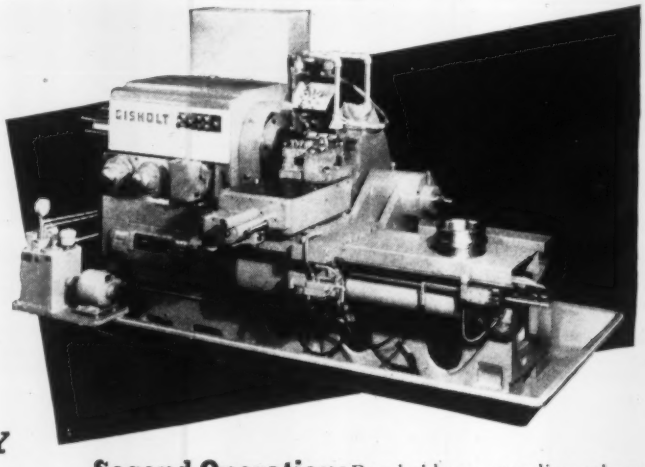
These big Gisholt No. 24 Hydraulics remove 34 lbs. of metal in two operations in a total of only 2.80 minutes' machining time on each of two machines. All cutting is on 52100 bearing steel and done at speeds of 325 to 350 f.p.m.

Speed is important, of course. But precision is the governing factor. How the Gisholt No. 24 does the job is a story that might mean real savings for you, too.

The No. 24 Hydraulic Automatic Lathe is a larger version of the famous No. 12 that has an outstanding success record on hundreds of jobs. If you have large volume precision work up to 24" diameter, the Gisholt No. 24 is the machine to investigate. Write for full information.




**First Operation:** Chucked on OD with 3-jaw hydraulic chuck, part is turned up to the jaws, faced, chamfered, bored and bore radius formed. Cam relief on rear tool block turns boring bit clear of workpiece as it is withdrawn.




**Second Operation:** Part held on expanding arbor by hydraulic pressure is finish turned, faced, chamfered and bore radius formed. Special rocker arm type carriage at rear tips in shaving tools to form both roller grooves with feed of .003" to .0045."

GISHOLT MACHINE COMPANY
*Madison 10, Wisconsin*

MASTERLINE GISHOLT SINCE 1887 GISHOLT

**ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY-REBUILT MACHINES WITH NEW MACHINE GUARANTEE**

# SCREW CORPORATION reports KEYSTONE XL meets rigid aircraft industry standards

Here's Keystone "XL" *flowability* in action. Extremely close tolerances were required for this Phillips head sealing screw. The uniform head for flush mounting and the accurately formed groove to hold the sealing ring must be precise.

A difficult Phillips recess—a small #6 round head with a #2 Phillips recess. The head diameter is out of proportion to recess diameter—a production reality when Keystone "XL" Wire is used.

Keystone "XL" Wire's *flowability* allows straight sides and sharp corners in heading of this Fillister head screw. Shaving operation was eliminated.

KEYSTONE XL WIRE STUDY

*flowability* IS THE SECRET

How important can a fastener be? Ask the folks at Screw Corporation. They'll tell you that all fasteners used by the aircraft industry must be perfectly formed.

Screw Corporation serves 200 aircraft customers from their headquarters at 157 N. Rivergrade Road, City of Industry (Los Angeles).

For one major aircraft manufacturer, Screw Corporation has produced fasteners by the millions—all made from Keystone "XL" Wire . . . *flowability* is the secret and the reason why Keystone "XL" Wire is the preferred cold heading wire. See your Keystone Wire specialist soon or write direct.

*Keystone Steel & Wire Company, Peoria 7, Illinois*

**KEYSTONE**
WIRE FOR INDUSTRY

This fastener is the base for one of the newer developments in electronics—the transistor. Screw Corporation reported this to be a difficult forming job—but the problem was solved with Keystone "XL" Wire.

These fasteners are magnetically inspected to insure no fractures before assembly. Keystone "XL" Wire passes this test daily on these flush fasteners which, with "O" rings, seal aircraft interiors so they can be pressurized.

**Keystone Steel & Wire Company**
**Peoria 7, Illinois**

Brand New . . . COLD HEADING FACTS FOLDER . . . send coupon today! New folder discusses uses, applications, methods, technical facts, wire requirements.

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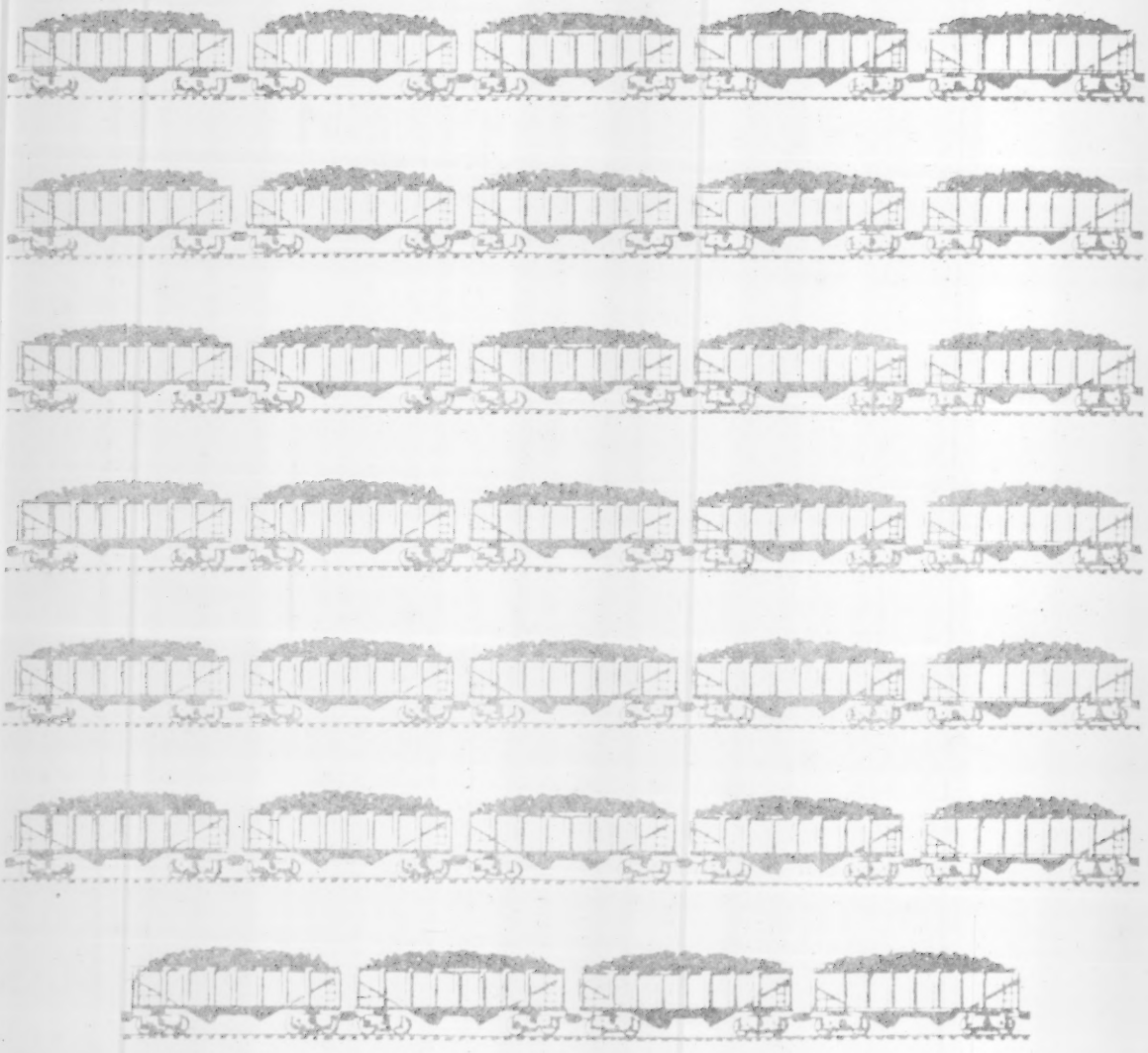

# SAVED... 34 CARLOADS OF COAL PER YEAR

## ...BY THE USE OF NEW COLD BONDERITE SYSTEM

That's the way one plant figures it. 1700 tons of coal saved per year because the Cold Bonderite System cuts steam requirements for the phosphating line by as much as 70%.

Have you asked the Parker man about the new Cold Bonderite System for your phosphating line? There's no reason for you to go on paying high steam costs when this new low temperature combination produces high quality results with real economy.

Your request for information on the new Cold Bonderite System will get high priority from us. Write, call or wire today.

*Since 1914— leader in the field*

# PARKER RUST PROOF COMPANY

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| BONDERITE | BONDERITE and BONDERLUBE | PARCO COMPOUND | PARCO LUBRITE | TROPICAL |
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| corrosion resistant paint base | aids in cold forming of metals | rust resistant | wear resistant for friction surfaces | heavy duty maintenance paints since 1883 |

**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

# SCHLOEMANN

## Five-Tube Tester

1. Singly movable heads
2. Jointly movable heads
3. Movable carriage
4. Charger and discharger
5. Prefill-water station
6. Pressure water station
7. Control desk

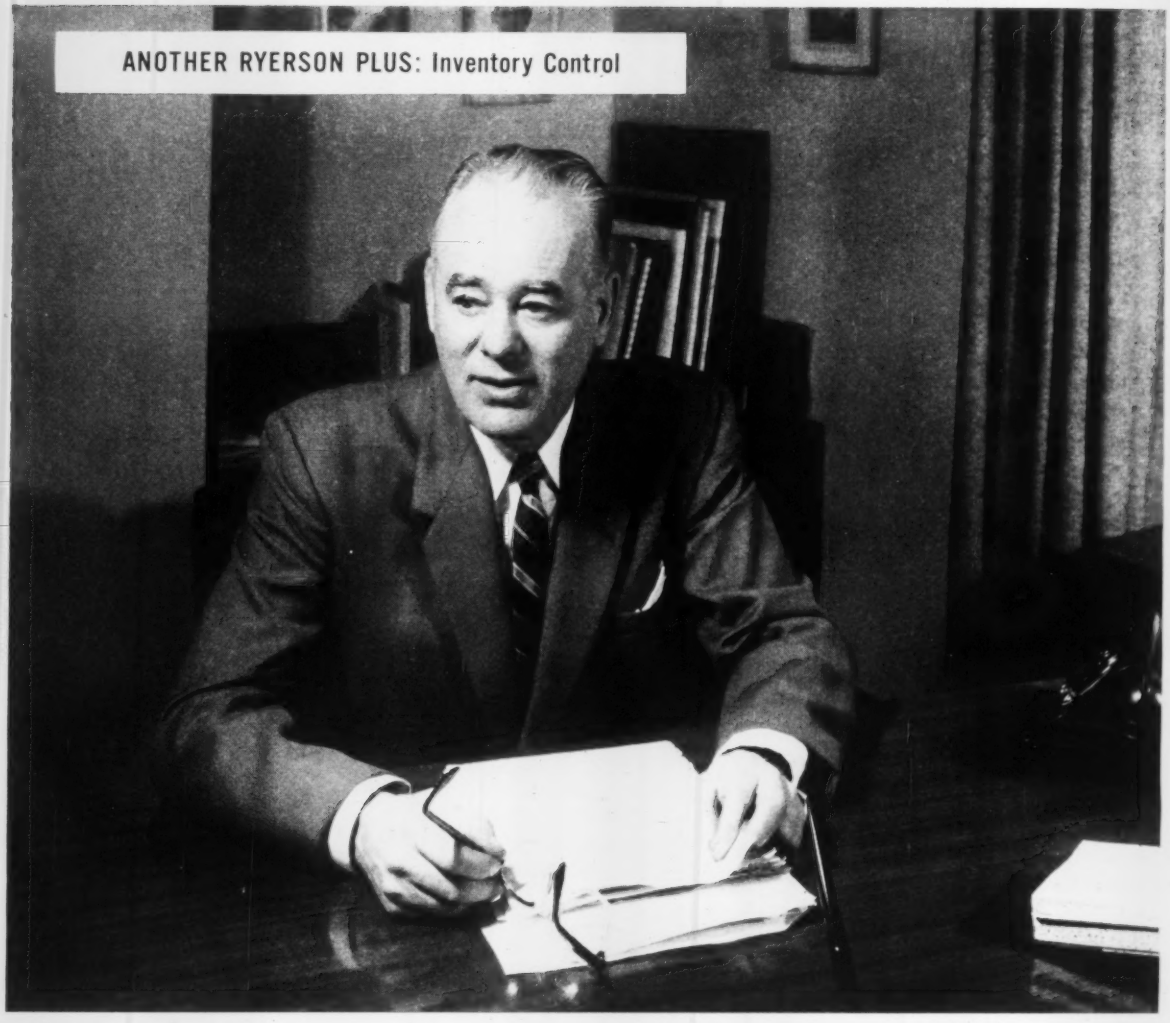
Photo: Courtesy of Jones & Laughlin Steel Corp.

**An outstanding machine now in successful operation at Jones & Laughlin Steel Corporation is the Automatic SCHLOEMANN Five-Tube Tester. Up to 1,200 tubes per hour can be hydrostatically tested in this machine, by either the face-sealing, or cup-sealing method. Automatic defective tube assorting device can be furnished. Only one operator needed.** *For complete information send for leaflet 31/1e.*

**SCHLOEMANN Tube Testers for the U.S.A. and Canada are manufactured by the AETNA-STANDARD Engineering Company.**

**FELLER ENGINEERING COMPANY** 1191 **Empire Building, Pittsburgh 22, Pa.**

HOT AND COLD ROLLING MILLS • COUNTERBLOW HAMMERS • HYDRAULIC PRESSES




# "Steel inventory problems? Ryerson solved them..."

You can pass your steel inventory problems on to Ryerson, too. When Ryerson carries your steel inventory, you profit several ways. You reduce your "cost-of-possession" factor . . . increase your material selection flexibility . . . and assure a ready, steady flow of material to meet production needs.

Ryerson will help you plan inventories of such materials as carbon, alloy and stainless steels . . . bars, structurals, plates, sheets and tubing . . . aluminum and industrial plastics. With Ryerson as your source, you store and handle only a safe minimum of material to meet your needs.

With Ryerson inventory control you can make design changes or revise production, with less inventory risk. Ryerson—with strategically located plants and unlimited stocks—stands ready to deliver the exact steel you require when you need it.

A call to the nearby Ryerson plant will bring you the profitable details on how Ryerson can help you with steel inventory problems.

RYERSON CERTIFIED QUALITY

**RYERSON STEEL**

Member of the Steel Family

*Principal Products: Carbon, alloy and stainless steel—bars, structurals, plates, sheets, tubing—aluminum, industrial plastics, metal working machinery, etc.*

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

STEEL

May 19, 1958

# Metalworking Outlook

## Lesson for the Future

"The coming wage rise (in steel) is a travesty of economics and sound business practice," says Charles M. White, Republic Steel Corp. chairman. "Our present labor contract, with its built-in wage increase, was made under great pressure at the end of a 34-day strike. The steel industry had little enthusiasm for the terms, but the three-year provision was attractive, and the size of the annual package was a step in the direction of bringing wage increases into line with productivity gains. But we had not expected a recession of such swiftness and depth." He adds: "I hope that both employers and union leaders will take such factors into account in future negotiations."

## Odds Still Against Auto Strike

Odds are still 4 to 3 against an auto strike. Walter Reuther obviously doesn't want one. The number of unusual proposals he has made (submit the dispute to arbitration, extend present contracts to this fall, vague suggestions about bringing Senator Kefauver into the act) indicates the nonstrike lengths to which he is prepared to go to get out from under. Two things stand out in the auto talks: Management is in the driver's seat for the first time in this postwar era. The Big Three auto companies are, in effect, bargaining jointly for the first time.

## Business Looks Better to Buyers

Look for an upturn of only moderate proportions by the fourth quarter, a panel of economists told the National Association of Purchasing Agents last week. At that time the economy will be about level with 1957's fourth quarter. Three factors will account for the upturn: 1. An increase in government spending. 2. A reversal in inventory liquidating that has been going on thus far this year. 3. Continued heavy consumer buying. An NAPA survey found that 72 per cent of the respondents expect second-half business to be better than last year's second half; 26 per cent anticipate the same level; only 2 per cent see a worsening.

## Why Do Prices Rise?

That's the question before the Joint Congressional Economic Committee. A sample of testimony: Dr. Edwin G. Nourse, chairman of the Council of Economic Advisers under President Truman—"We need to re-establish conditions of price competition in place of power competition. The power of giant unions and corporations to raise wages and prices gives the economy an inflationary bias." G. V. Ensley, executive vice president of the National Association of Mutual Savings Banks—"Price stabilization must be an objective of public policy." Leo Fishman, West Virginia University economist—"Price stability as a key government objective might seriously reduce our chances of realizing or approximating the optimum growth rate."

## Memphis Case Snowballs

The Memphis case will continue to tie up millions of dollars in steel orders for months to come. (The District Court of Appeals ruled that unilateral

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# Metalworking Outlook

filing of rate increases by the gas companies was not allowed under the Natural Gas Act.) Because some $200 million in rebates would have to be made if the Supreme Court upholds the lower court's ruling, few companies are expanding until the issue is clarified, and the High Court refuses to consider it until its fall term which begins in October. Here's the magnitude of at least five expansion projects which were postponed: 1. $283 million. 2. $110 million. 3. 60,000 tons of steel pipe. 4. 21,303 tons of steel pipe. 5. 249,000 tons of steel pipe.

## Oil Pipe That Coils Like Fire Hose

The Russians claim they have developed oil-field steel pipe that can be rolled up like a fire hose. An article in Russia's *Industrial-Economic Gazette* says the flat-rolled pipe—up to 150 mm (6 in.)—is made on an electric welding mill. Two steel strips up to 750 meters (2460 ft) long and 2 mm (0.07874 in.) thick are welded along the sides and form a flat pipe. The Soviets claim the flat pipe saves 50 per cent in metal, and labor required to lay it is reduced ten times.

## Steel Expansion Coming

Although the steel industry is operating at only about half its rated capacity, it should add between 30 and 40 million tons of ingot production capability during the next ten years. So predicts R. F. Sentner, executive vice president, commercial, U. S. Steel Corp. He sees four factors as most important in contributing to growth by the late 1960s: 1. Normal auto output will reach 8 million cars per year. 2. Construction will increase 25 to 30 per cent. 3. Research and development expenditures will add 35 per cent to machinery output. 4. Appliance production will grow by nearly 50 per cent.

## Armco To Build New Mill

Armco Steel Corp. will eventually build a 1-million-ton-per-year steel plant and seamless pipe mill to supply its new subsidiary, National Supply Co. Armco put no date on when it would build the plant but gave a hint when it indicated "some three years" would elapse before it could be in a position to supply all of National's needs. U. S. Steel and Crucible Steel Co. of America now furnish most of them under contracts which expire in 1964 and 1962. The Armco mill would probably be built in Houston.

## Straws in the Wind

In another three or four months a gradual and steady turn upward will occur in steel, predicts L. S. Hamaker, Republic Steel Corp.'s general sales manager . . . Recession's side effect: A shortage of blast furnace slag, resulting from low operating rates, is threatening construction in some areas such as Youngstown . . . Linde Co., a division of Union Carbide Corp., is building a 1000-ton-a-day oxygen plant at U. S. Steel's Duquesne (Pa.) Works which will supply that facility plus three others in the area via pipeline.

**NOW** MORE THAN EVER

# MARVEL HIGH SPEED EDGE HACK SAW BLADES

**should be YOUR FIRST CHOICE**

This is no time for "second-best" performance from your hack sawing machines. Today, every cut you make on a hack saw should be done as quickly, accurately, and economically as possible.

The *blades* you use can often mean the difference between mediocre work and top performance from your hack sawing machines. Here are 3 big advantages unbreakable MARVEL High-Speed-Edge Hack Saw Blades can bring to your cutting-off operations:

**1 HIGHER PRODUCTION . . .**

MARVEL High-Speed-Edge Blades are shatterproof and can be worked harder and faster than any other blade. They will withstand the highest speeds and heaviest feeds attainable on any hack sawing machine with complete safety. Machine operators working with MARVEL Blades naturally apply greater tensions, feeds, and speeds because they know they are safe from personal injury accidents. The result is faster cutting-off.

**2 GREATER ACCURACY . . .**

MARVEL Blades can be safely tensioned from 200% to 300% more taut than ordinary blades. Higher blade tensions produce greater rigidity of the high-speed-steel cutting edge, resulting in maximum attainable accuracy of cut-off blanks.

**3 LONGER BLADE LIFE . . .**

Each MARVEL High-Speed-Edge Hack Saw Blade is triple tempered to assure maximum toughness of the cutting edge. MARVEL Blades not only give you longer life, they assure a more efficient cutting life and lower blade costs.

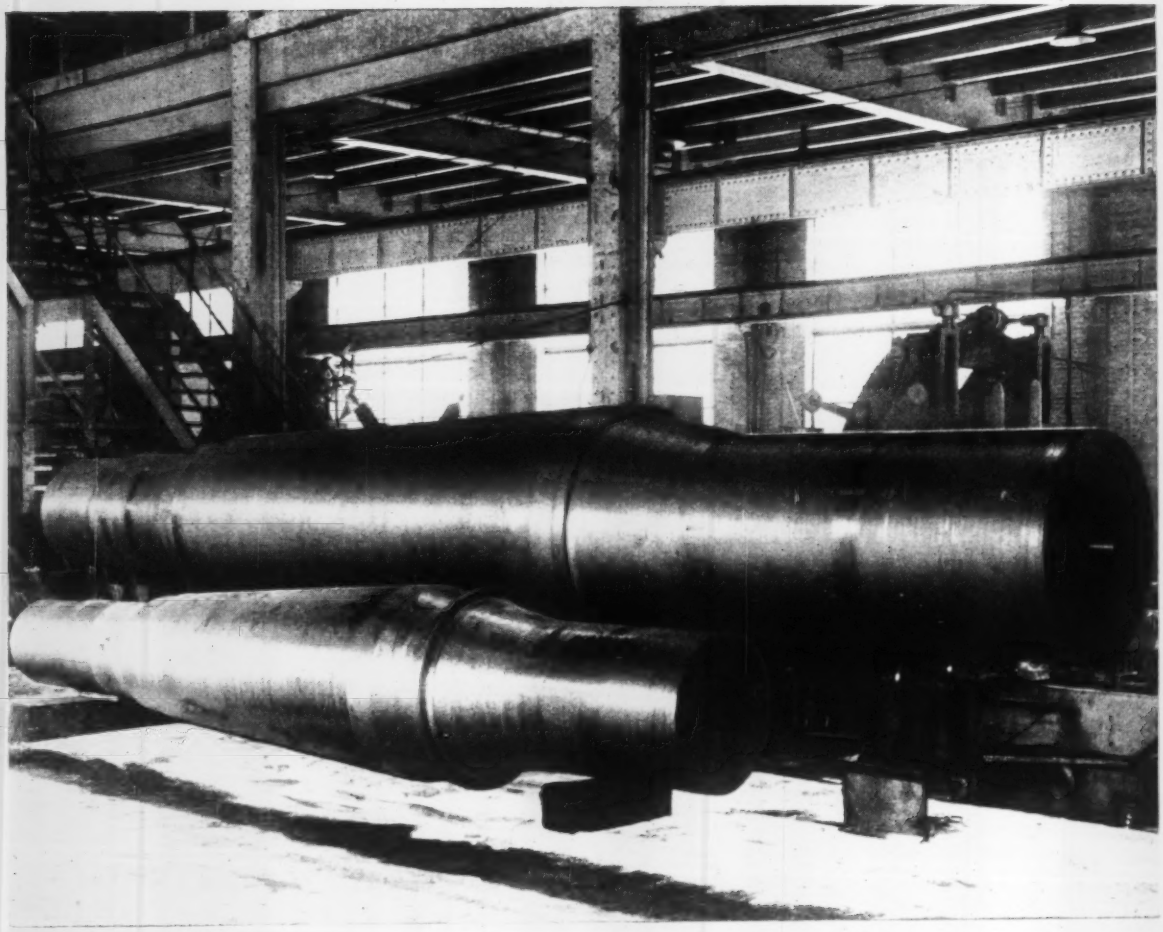
**Why gamble? Demand MARVEL Blades by name, and be sure you're getting the best blades on the market. Leading Industrial Distributors have them in stock.**

B-1123

*Write for the new MARVEL Cutting Tool Bulletin and the name of your nearest MARVEL Distributor.*

**ARMSTRONG-BLUM MFG. CO.**
5700 BLOOMINGDALE AVE. • CHICAGO 39, ILLINOIS

Metal Cutting MARVEL SAWS
Better Machines—Better Blades



*Forged from 3½% Nickel Steel – These gyratory crusher shafts weigh 102,000 and 34,000 lbs. and are 25 and 17 feet long respectively. They were produced by Bethlehem Steel Company, Steelton, Pa.

## *In large forgings like this...**

# You get desired properties reliably with Nickel Steel

Usually husky parts like this cannot be quenched without special facilities.

How then do you get the superior mechanical properties often required in heavy-sectioned parts?

By selecting a nickel alloy steel that doesn't need a liquid quench to develop strength and toughness.

### Why Nickel?

The tests of time and laws of metallurgy have proved nickel to be most valuable in developing high mechanical properties in heavy forgings. Nickel, often acting with other alloying elements, increases the hardening response of steel parts too large to liquid quench. The resulting microstructure formed gives added strength and improved toughness.

### Do you have a problem?

Nickel alloy steels are used for dependable trouble-free performance in the most demanding applications. Send us the details of your problem. We may be able to help you – write today.

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N.Y.

# Selling in Europe

**Florence, Italy**—As an American businessman, you should watch the growth and development of Western Europe as an economic and political unit over the next few years.

For many years, Europe's problems have stemmed from overpopulation, substandards of living, and small political units with high tariff walls. Only since World War II has there been any peaceful remedial action. An effective approach has been through the European Steel & Coal Community, which includes France, Italy, Western Germany, Luxembourg, Belgium, and Holland.

The ESCC lifted the barriers on the free interchange of steel and coal within the six countries in 1953, and the arrangement has been working surprisingly well. In fact, it provided the encouragement for the same six countries to set up a common market for all goods as of Jan. 1, 1959.

In trading among themselves, the common market countries will reduce tariffs 10 per cent on Jan. 1. Over the next dozen years, tariffs will gradually be abolished. Duties on goods shipped into the common market will be the average for all six countries.

Not to be confused with the common market is the plan for a European Free Trade Area. It will combine all 17 member nations of the Organization for European Economic Co-operation. In addition to the six common market countries, they are Great Britain, Ireland, Iceland, Portugal, Norway, Sweden, Denmark, Switzerland, Austria, Greece, and Turkey.

Many knotty problems require solution before the Free Trade Area comes into being, European trade and political leaders tell us. For example, French and Belgian possessions are part of the common market and would be part of the free trade area. Britain's colonies would not be included. Other problems include currency control, taxation, and free movement of labor.

Even so, we are told, all Western Europe is eager to make the plan a reality. It will be adopted. Then Western Europe's 200 million people can benefit from the same mass production techniques that have contributed so much to America's higher standard of living.

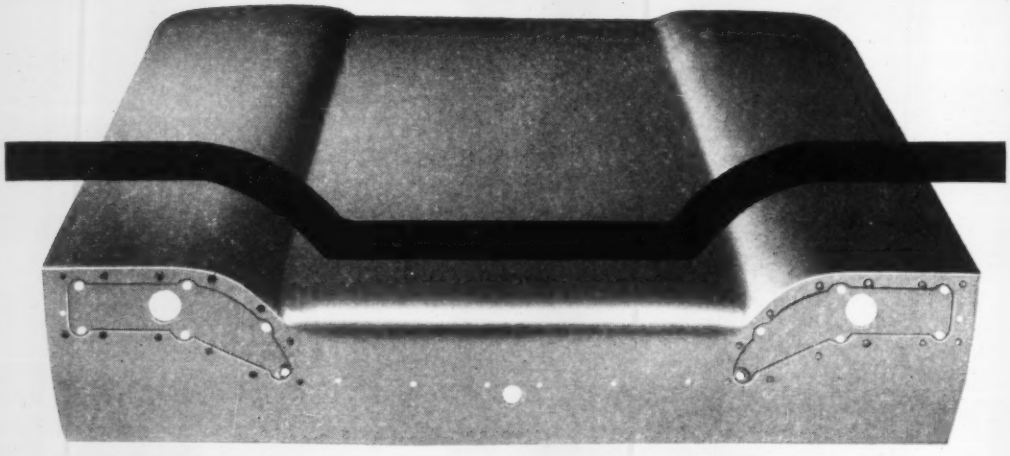
At first blush, it would appear that Europe is closing its doors on trade with the U. S. Europeans don't see it that way. Greater prosperity will mean more trade, they say, not less. There will also be plenty of opportunities to set up branch plants, make manufacturing arrangements, and exchange technical know-how.

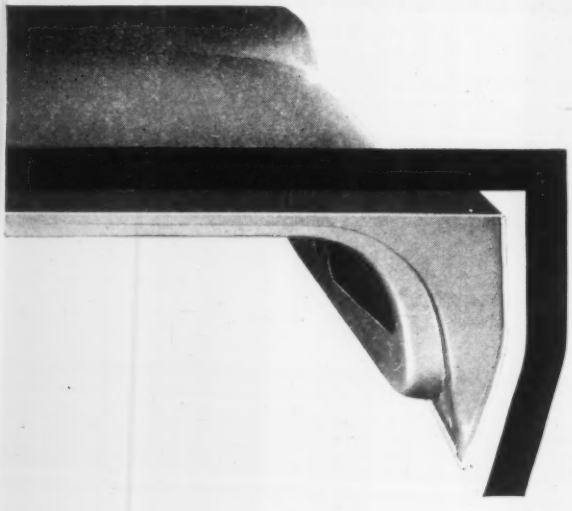
We agree that Europe should be included in your selling plans.

Irwin H. Such
EDITOR-IN-CHIEF

*Inland "Job-Tailored" cold rolled sheets work better*

## product: AUTOMOBILE TRUNK LID





## problem:

An automobile manufacturer was having difficulty finding a steel sheet that would take the severe fabricating required to make the trunk lid of a new model. The part called for a tough draw, and the metal flow was very restricted. Finish of the steel was also an important factor. No one could provide a steel sheet that would do the job without excessive breakage.

## solution:

Inland came up with a special Drawing Quality Killed Steel, "job-tailored" for this part. The steel took the difficult fabricating operation... solved the problem... and permitted the manufacturer to get his new model automobile out on schedule.

**INLAND STEEL**

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At your service soon . . . Inland's new Cold Mill and a 50% increase in capacity for cold rolled sheet products.

INLAND

*Cold Rolled Sheets*

Russell, Burdsall & Ward Bolt & Nut Co.

# Part Prices Hit Plateau

PRICES of most metalworking components will stabilize at present levels or drop slightly the rest of this year. Increases are anticipated by only a few industries.

Despite spiraling costs, markups are being postponed because of competition stemming from weak demand and overcapacity in some industries. Price cutting, special discounts, freight allowances, and other sales incentives are widespread. Although most companies don't believe prices will fall much lower, you can expect sporadic reduction through the third quarter, especially if business worsens.

But look for a round of increases the minute sales spurt. Many companies complain that their return on investment is too low; some are operating at the break-even point.

Here's how 14 categories look:

**Gray Iron Castings**—Volume is considerably below last year's. Many foundries are operating near 50 per cent of capacity, leading to stiff competition and price cutting in many areas. It's not uncommon for a shop to take a job at the break-even point to help reduce fixed costs.

An expected increase in pig iron prices and higher labor costs for many companies will make the profit situation even worse. But a price hike any time soon is doubtful unless both labor and materials go up more than anticipated. Price outlook: Relative stability for the next six months, with some price shading while business stays down.

**Diecastings**—Quoted prices have pretty much stabilized in the last six months, but as one caster says: "They're just the starting point."

Recent reductions in aluminum and the zinc diecasting grade have been passed on to customers. Few big labor increases are anticipated. The outlook is for little change through the fourth quarter, though most producers report strong customer pressure for more special price considerations.

**Nonferrous Castings** — Sales of most foundries are down 20 to 30 per cent. Price hikes have been practically nonexistent since last October. Severe price shading seems to be confined to the West Coast and parts of the Midwest.

Foundrymen hope to hold present prices this year, but customers may force reductions in some areas. Outlook: Stabilization probable; some decline possible.

**Steel Castings**—Sales are down as much as 50 per cent. Price cutting has been common, but casters hope it has about stopped.

It's generally believed that price reduction will halt if material and labor costs go up this summer. Competition will rule out increases.

**Antifriction Bearings**—Most manufacturers raised prices 5 per cent last fall; scattered increases in January averaged around 3 per cent.

Companies report sales are 14 to 33 per cent under last year's. But price fighting is not a serious problem. One company reports sporadic trimming on bearing accessories.

Several firms expect increased labor and material costs to force prices up about 5 per cent in the fall. Others see stabilization through 1958.

**Gears**—Makers report sales are

## Gainsbrugh: On Prices

"PRICES may dip or stabilize over the rest of 1958 even if costs rise," says Martin R. Gainsbrugh, chief economist, National Industrial Conference Board, New York.

His reason: In a prolonged recession, supply and demand, rather than cost, determine price. "For the rest of '58, industrial prices could range from stable to slightly downward. Consumer prices are slower to respond, but they may stabilize or decline modestly later in the year," he says.

Raw material prices declined early in the recession. Nonfarm wholesale prices in March were 0.3 per cent under those of August, 1957; in fact, that index has been on a plateau for about a year, comments Mr. Gainsbrugh.

**Concessions**—"Companies with idle capacity are tempted to get a larger share of the market through special deals. Many such concessions don't show up in the index," he continues.

Manufacturers are squeezed by rising costs of labor, transportation, and all types of taxes, he adds, compelling companies to re-examine pricing structures. Industry must rediscover how to make a profit under extremely competitive conditions.

"That situation penalizes the high cost, submarginal firm but produces a more efficient system. Some firms will make adequate profits despite intensive competition . . . largely through greater cost control, more efficient administration, and greater productivity."

**Plus Factor**—Rising research and development expenditures and long range planning are looked upon as forces that will maintain business investment at a high level during postwar recessions. Industry is still pledging its loyalty to long range targets, "a healthy symptom."

**Future**—Signs of a business upturn by the fourth quarter: Elimination of excess inventories, gains in home building, highway and defense spending, restructuring of costs, and the introduction of new products.

"I believe the recession is building a sounder base for long range prosperity, especially in the 1960s," Mr. Gainsbrugh says. But he sounds this note of warning: "I hope we will become more keenly aware of the long range dangers of wage increases in excess of productivity gains than we have in the past. If not, we may again price our products out of the market and create a hard core of persistent unemployment."

25 to 50 per cent off last year's pace. Bookings fell 30 per cent.

Competition has tightened, resulting in price cuts. Some firms have held the line since last fall, but many say they are beginning to sharpen their pencils.

Manufacturers fear they will be hit with higher labor and material costs during the summer and fall. But prices will probably be held at about present levels throughout the year. A minority believes prices will advance slightly late in the third quarter.

**Stampings** — Official prices haven't varied since late last summer and early fall when most companies put through an increase of around 5 per cent. But price cutting is a major complaint of some companies; others say they haven't been affected too much by it. "Bargains" have been most prevalent in nonferrous stampings, reflecting the lower costs of the base metals.

Opinion on the likelihood of an advance in prices is evenly divided. One faction says that profits have been squeezed to the limit, and an increase in materials (particularly steel) and labor would call for a markup of around 5 per cent. Another group believes poor business (sales are down 25 to 50 per cent) and customer resistance will either force prices down or hold them.

**Electric Motors**—Business is running 1 to 20 per cent under 1957's. Price shading is probably less prevalent than it is in most industries.

Official price lists have been revised upward and downward in the last six months. One company said it upped prices on integral motors 5 to 6 per cent in March while holding the line on fractionals. An Ohio firm boosted prices of small motors by 3 to 6 per cent. Another company lowered quotations 3 to 7 per cent. Outlook: Some increases, a few decreases.

**Forgings**—Business for most forgers is way down. The result: Price slashing.

"Most companies want to keep their plants running at capacity regardless of prices," says one firm. A Pennsylvania forger says some list prices have been reduced, and some discounts have been changed. The company has cut automotive prices 10 to 20 per cent, while some cataloged items are down only 6 to 8 per cent.

The industry is pretty much geared to steel. (Around 40 per cent of a forging's cost is based on the price of steel; and most companies have labor contracts with the USW.) But it's doubtful if the industry can push through an increase this year.

**Mechanical Rubber Goods**—List prices haven't changed since last fall's round of hikes, but widespread price pruning has been going on since the first of the year. (One

company says it's much worse than it was in 1954). Causes: Low volume and industry overcapacity.

Makers look for prices to stay weak throughout the summer and early fall and start firming in November and December. It's possible a small rise might come in early 1959. A qualification: One manufacturer says if the price of crude rubber should go up, the industry would have to adjust prices.

**Fasteners**—Competition is tight, with production exceeding demand. Most makers say sales are off a minimum of 20 to 25 per cent from last year's.

Posted prices don't mean much. Concessions include quantity deviations and freight allowances.

Manufacturers expect material and labor costs to go up this summer but believe demand is too light to support an increase. Outlook: Prices may not go much lower, but there's little chance of an early upturn.

**Relays**—Prices are little changed from those of six months ago. Reports of price cutting are few.

Most makers report sales declines of 5 to 25 per cent. One company believes prices will fall, but the general feeling is that they will hold at present levels till yearend.

**Screw Machine Products**—Sales of most companies are down sharply, resulting in price cuts ranging from 4 to 20 per cent.

Most makers feel that price cutting has about run its course. Look for relatively stable prices the rest of the year.

**Springs**—Business is down by 20 to 35 per cent. Prices are down: One manufacturer believes 5 per cent is the industry average. A Chicago company says it's doing 300 per cent more quoting than normally, reflecting more shopping.

Competition dictates no radical increases, but some makers say they'll have to jack up quotations if they get hit with added labor and material expenses this summer. An increase before late fall is doubtful.

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• *An extra copy of this article, the second in a five-part series on metalworking's pricing prospects, is available until the supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. Last week, the editors examined the price outlook in steel and in succeeding weeks will study the situation in equipment, construction, and consumer durables.*

# Labor Roundup (Except Auto)

**With spotlight on Detroit, nonautomotive developments are overlooked. What's happening: Moderate increases being granted. Escalator clauses are common fringe demand**

UAW-AUTO TALKS are getting the publicity, but negotiating sessions on smaller company fronts are important, too.

Such settlements often are equally important to your bargaining. They may be even more valuable because they suggest:

1. Successful bargaining can be based on your "economic situation," as well as industry trends.

2. Area wage rates are more relevant than industry or national trends.

3. If you bargain honestly, employee loyalty will be with the company instead of the union, particularly in disputes over ability to meet wage demands.

**Where**—Most active bargaining areas: The East Coast, the Cleveland area, the Chicago-Milwaukee district. Pittsburgh industry is tied to the steel industry which has automatic wage increases (7 to 13.6 cents per hour) due July 1. Most Michigan contracts are geared to those of the auto industry.

**Who**—Associated Industries of Cleveland has helped members complete contracts this spring with average direct wage increases of 7.6 cents per hour. AIC officials report that although most contracts signed are for longer than one year, the number of single year contracts is substantially greater than it was in 1957.

James I. Poole, consultant with Fairchild, Foley & Sammond, Milwaukee, says most metalworking settlements in that area range from 8 to 11 cents per hour. There is little change in fringe benefits.

The Chicago local of the International Moulders & Foundry Workers settled with 22 foundries for 7 cents an hour. The National Foundry Association reports the national average for settlements is close to 5 cents. Several Iowa firms, hard pressed for business, negotiated contracts without wage hikes.

The New York State Department of Labor says January and February settlements average 8 to 9 cents. O. C. Cool, director, Labor Relations Institute, Newark, N. J. gives a 7 to 10 cent figure for his area, plus an additional holiday in several contracts.

Several midwest machine tool builders signed contracts calling for 12 cent an hour increases (same as last year).

**Fringe Benefits**—Cost of living provisions are a major issue. One-fourth of the Cleveland area settlements included it. Unions are usually willing to take lower wage increases to gain the concession.

In the Pittsburgh area, unions have broached reopening contracts—even with automatic wage hikes on tap. Objective: To win a cost of living provision (now 12 cents an hour in Steelworker contracts).

**Extensions**—One of the easiest things to gain is a contract extension until fall. Some firms have taken it rather than grant direct wage increases now. They have two reasons. If business improves, they'll have a better idea of what they can afford, and they want to see how auto and farm implement industry agreements (they expire Aug. 1) come out.

Unions aren't fighting extensions because employees understand why management asks for them. But workers will probably strike if you refuse an increase they feel you can afford now or this fall. They won't walk out if you offer an extension to await the outcome of big league bargaining and the fall business picture.

The unions aren't being especially philanthropic. They figure that they'll probably get a bigger increase if they wait for business to improve.

**Advice**—Most executives still say: Avoid, if possible, "ability to pay" arguments. Opening your books to the union is dangerous. It doesn't guarantee a no-wage-boost settlement, and you may find yourself bargaining on your profit margin instead of wages.

THE ZINC-LEAD PROBLEM:

## More Production . . . Than Consumption . . . Sends Stocks Spiraling[2] . . . and Forces Prices Down[3]

| | Domestic Smelter[1] | Net Imports[4] | | | (Cents per lb) |
|---|---|---|---|---|---|
| | | | ZINC (tons) | | |
| 1956 | 1,062,954 | 236,000 | 988,000 | 68,622 | 13.494 |
| 1957 | 1,057,450 | 268,300 | 924,000 | 166,655 | 11.399 |
| | | | LEAD (tons) | | |
| 1956 | 1,116,855 | 258,026 | 1,209,000 | 41,181 | 16.013 |
| 1957 | 1,089,680 | 319,940 | 1,119,700 | 90,777 | 14.658 |

Source: U. S. Bureau of Mines. [1]Includes both primary and secondary production. [2]Inventories in hands of producers. [3]Average yearly price; zinc price: East St. Louis (Ill.) basis, lead price: New York basis. [4]Imports minus exports.

# Lead-Zinc Research Aims To Boost Uses

LEAD AND ZINC have a good long range future if planned research and market development projects are successful: That's the consensus of metalmen who admit their industry has neglected research and have only paid lip service to promotion.

**Project Research**—The Lead Industries Association and American Zinc Institute are undertaking joint research. Companies, research agencies, and universities will participate in the world-wide effort. "No limit has been set on expenditures for research," says R. Hendricks, chairman of the joint committee and sales vice president of Consolidated Mining & Smelting Co. of Canada Ltd.

J. L. Kimberley, AZI's executive vice president, says zinc research getting started covers: 1. Better rolled alloys. 2. Improved pigments. 3. More economical diecasting finishes. 4. Improved anodes for cathodic protection. 5. Resistance of galvanized products to wet storage stain. 6. Increased resistance of hot water storage tanks to corrosion. 7. More diecasting research (such as anodizing, corrosion). 8. Expansion of technical and promotional research for galvanizing.

R. L. Ziegfeld, LIA's secretary-treasurer, cites these priority areas for lead research: 1. Reinforced metal (where it needs higher physical properties). 2. Improved heat emission properties through compound coatings. 3. Alloys, related powder metallurgy, and insoluble suspension studies. 4. Chemical compounds. 5. Enamels for steel. 6. Ceramic uses. 7. Construction and plumbing uses.

**Hard Sell**—Promotion appears to be headed in the right direction. But there's a long way to go. Says John D. Bradley, president of the Bunker Hill Co., San Francisco: "We are starting practically from zero."

Simon Strauss, sales vice president of American Smelting & Refining Co., New York, adds: "The 11 lead and zinc producers spent about $1.25 million to sell $450 million worth of metal in 1956. Sales expenses are proportionately smaller than those in any other industry."

LIA's program has been increased about 200 per cent over 1957's, says Mr. Ziegfeld. AZI is stepping up its efforts mainly through consumer contact.

**Troubles**—But it's the depressed market that most worries producers. During the first four months of this year (vs. 1957's like period), total shipments of slab zinc dropped from 338,202 tons to 238,674 tons; stocks rose from 105,531 tons to 221,171 tons.

One mildly encouraging factor: Smelter production dropped to 293,185 tons this year, vs. 374,960 tons last year.

Lead statistics make grim reading. First quarter domestic shipments dropped from 116,291 tons in 1957 to 86,139 tons. At the end of March, producers' stocks were up 180 per cent to 128,754 tons, the highest since July, 1939. Production dropped only about 9 per cent to 138,239 tons.

The troubles of the lead and

zinc industries stem from these factors, says Mr. Strauss:

1. Overexpansion of production facilities resulting from defense efforts and the government's stockpile and barter programs.

2. The recession, which came about the same time as the cessation of the stockpile and barter programs. The only solution is more consumption at home and less production overseas, he says.

**Less Money** — More production than consumption pushed prices down sharply. Lead was 16 cents a pound on Jan. 1, 1957. Its price (presently 11½ cents) has been cut seven times. Zinc was 13.5 cents a pound in January, 1957. It's now 10 cents.

**More Woes** — Another problem: The virtual cessation of stockpile and barter. The stockpile siphoned off about 14,000 tons of zinc a month, a little over 7000 tons of lead. It ended this month for zinc and will cease for lead in June.

The barter program is about finished because of Department of Agriculture policies. Foreign lead and zinc were swapped for U. S. wheat and stockpiled.

**Imports** — Pig lead imports jumped about 62,000 tons last year, slab zinc, around 32,000 tons (see table). Imports are down a little this year.

Last month, the Tariff Commission made its long awaited recommendations on the domestic industry's pleas for relief under the escape clause of the Reciprocal Trade Agreement Acts (STEEL, May 5, p. 55). Commissioners split on the amount of relief and on whether to impose quotas on imports.

Administration's countermove: Interior Secretary Fred A. Seaton proposed a multimillion dollar subsidy measure that would pay domestic producers the difference between the quoted U. S. price and a "stabilized" price of 14.75 cents a pound for lead and 12.75 cents for zinc.

Both Congress and industry appear to be opposed to the plan as it now stands. If the proposal is voted down, the President will probably grant some of the Tariff Commission's recommendations. Or the domestic industry might ask Congress that higher duties be imposed whenever the U. S. price falls below stipulated "peril points" (a suggested 17 cents for lead, 14.5 cents for zinc).

**Markets** — The business falloff started in most consuming areas last year (see table) and continued into the first quarter. Sales in the second quarter have been spotty.

Charles R. Ince, vice president of sales, St. Joseph Lead Co., New York, looks for a slight seasonal sales pickup this quarter. Reasons: A gain in construction needs for galvanized sheets and lead, a pickup in auto production bringing greater demand for diecastings and batteries, the normal spring improvement in tetraethyl lead sales and power cable installations. C. J. Johnson, sales manager for Eagle-Picher Co., Miami, Okla., sees no improvement until the fourth quarter. Howard I. Young, president of American Zinc, Lead & Smelting Co., St. Louis, chooses the third quarter.

**Zinc Uses**—Healthy growth is predicted for galvanizing. Ralph C. Miller Jr., assistant manager, sheet mill products division, Jones & Laughlin Steel Corp., Pittsburgh, says per capita consumption of galvanized sheets (35 lb in 1955) should hit 37 lb by 1960, 43 by 1965. He sees sheet production rising from 1957's 2.4 million tons to 2.42 million in 1958, 3.3 million in 1960, 4.1 million in 1965.

Sheet shipments in January and February were slightly over 354,000 tons, about 10,000 tons under the year-ago figure. One major galvanizer says his volume is off 15 to 20 per cent. "We expect no further decline but see no important pickup in the next six months," he says.

Zinc diecasting sales in January and February were 36 per cent below what they were in the same period of 1957, mainly because of the slump in auto and appliance production, says the American Die Casting Institute. Makers of business machines are expected to take up some of the slack.

Zinc producers are split on whether the auto market has been saturated. Most believe per car use will rise. About 70 lb of zinc (mostly diecastings) were used in the average '58 car. Potential: General Motors Corp. and Chrysler Corp. are studying galvanized sheet usage for gas tanks. Its use

## Domestic Consumption Dip Started Last Year

(Tons)

| | 1957 | 1956 |
|---|---|---|
| **LEAD** | | |
| Storage Batteries | 353,932 | 370,771 |
| Tetraethyl Lead | 177,001 | 191,990 |
| Cable Covering | 108,192 | 134,339 |
| Construction | 113,338 | 124,956 |
| Pigments | 112,215 | 120,370 |
| Solder | 69,284 | 75,290 |
| Ammunition | 42,488 | 44,438 |
| All Others | 143,250 | 146,846 |
| Totals | 1,119,700 | 1,209,000 |
| **ZINC** | | |
| Galvanizing | 355,796 | 421,218 |
| Zinc-Base Alloys | 370,177 | 352,451 |
| Brass and Bronze | 111,114 | 122,395 |
| Rolling Mills | 39,544 | 45,382 |
| Oxide Plants | 20,486 | 19,160 |
| All Others | 26,883 | 27,394 |
| Totals | 924,000 | 988,000 |

Source: U. S. Bureau of Mines.

in mufflers has improved because of more dual exhausts with resonators. (But '59s and '60s may have fewer twin pipes.)

**Lead Uses**—The largest customer, the battery industry, sold 3,808,000 units in January and February, down 17.2 per cent from the same period last year. Outlook for the year: 32,000,000 unit sales, vs. 33,696,000 in 1957, says D. Nevin Smith, vice president, Electric Storage Battery Co. The industry is expected to take 336,000 tons of lead in '58, a drop of about 5 per cent from 1957.

Tetraethyl lead sales are down. E. I. du Pont de Nemours & Co. estimates nationwide sales in the first quarter were about 7 per cent below those in the like period of 1957. Second quarter sales are expected to be about 4 per cent below last year's. But second half business may better 1957's by 3 per cent, says Du Pont. J. A. Costello, vice president, Ethyl Corp., New York, sees 1958 sales near the '57 level. He looks for modest annual increases in the next five years.

Lead faces a tough fight with other materials in construction, cable sheathing, and pigments. It's use as a fluxing agent in ceramics should show good growth.

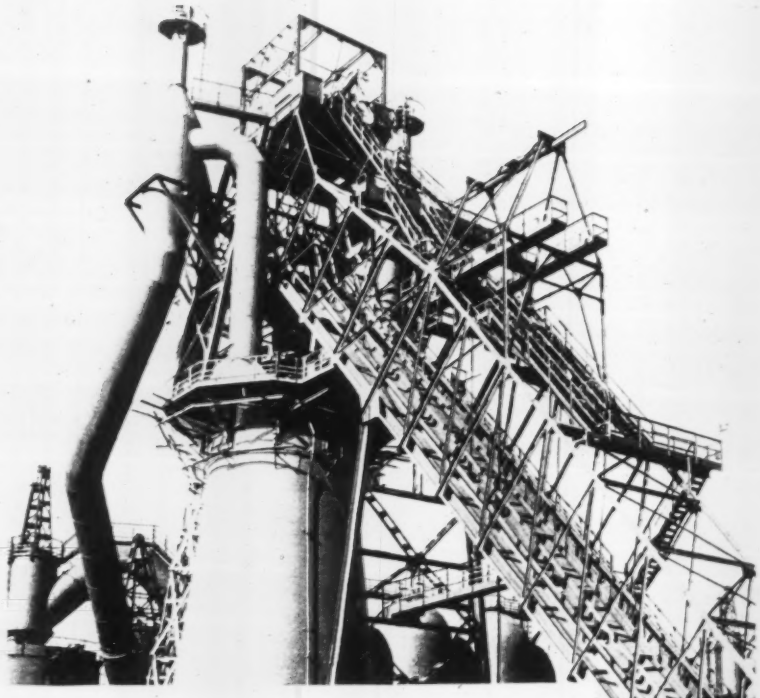
Bright future: Shielding for atomic reactors. Long range: Space flights will require an estimated 100 lb of lead shielding per person.

**1958**—Lead and zinc sales will follow the general business pattern this year. Prices aren't expected to advance until demand improves substantially (unless the government grants a higher than expected protective tariff).

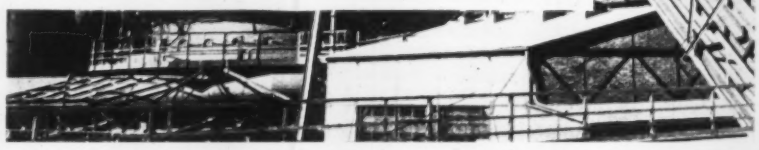
Price will fluctuate less in the next ten years than in the last 15, believes Mr. Strauss. Mr. Young believes zinc will average 12.5 to 14 cents a pound the next decade.

**Future**—Says Mr. Bradley: "I think we (both metals) have already suffered our consumer losses. Watch us in the next five to ten years."

Says Mr. Young: "The use of zinc as a protective coating is becoming more important each year. Diecasting uses will increase, as will zinc anodes for cathodic protection. Zinc has grown 22 to 28 per cent in the last eight years, and its use will keep pace with the rise in population."



**STEEL Goes to Europe**



**Cornigliano Works at Genoa is one of several units controlled by Societa Finanziaria Siderurgica (Finsider). The plant recently put in a Wean tinning line**

# Italian Steel: Down Slightly

ITALY's steel industry is not experiencing a recession, but there is some apprehension concerning the remainder of this year.

In the first four months, Italian mills turned out 2,390,000 tons of steel ingots (1.1 per cent under the 2,416,000 tons produced during the comparable period in 1957). April production was 589,570 tons, vs. 606,000 tons a year ago.

If the trend continues, 1958 production will be 4 to 5 per cent under the record 7,479,274 tons produced in 1957.

**Optimistic**—Prof. Ernesto Manuelli, director general of Finsider (Societa Finanziaria Siderurgica), says he is not pessimistic. (Finsider is a holding company that controls several steel mills.)

In a personal interview, the head of Italy's giant steel group told STEEL he is convinced the dip will be brief. He says it reflects a psychological reaction to the situation in the U. S. and temporary unrest over the Italian national elections (May 25).

**Market**—Traditionally, Italy imports more than she exports. But in 1956 and 1957 she became a net exporter of steel for the first time. Imports and exports will be about even this year, due to slower demand for seamless tubes in the

U. S., Venezuela, and the Middle East. Italy's biggest producer is Dalmine S.p.a., a Finsider plant near Milan.

Flat-rolled products are moving well because of activity in the auto and shipbuilding industries. Bar products are weak because of a decline in construction.

Uncertainty over the elections stems from a communist campaign to win more seats in Parliament. Christian Democrats (46 per cent of the vote in the last election) are expected to retain control by joining forces with three smaller parties.

Communism is a problem in Italy. Only way to beat it, says Professor Manuelli, is to raise living standards. Much has been done. Steel consumption rose from 265 lb per person in 1956 to 287 lb per person last year. But this figure is still one of the lowest in Europe. Consumption per person in Germany last year was 971 lb, in Benelux nations 728, and in France 628.

**Progress**—Italy established a ten-year plan in 1956 to increase her gross national product 5 per cent a year. At 15.3 trillion liras (about $24.5 billion), the GNP in 1957 was 50 per cent above 1952's.

Steel is an integral part of the plan. The goal is for 8.3 million to 9.4 million tons of ingot capacity by 1960, 11 million to 13.8 million by 1965.

**Nationalism**—Italy's steel industry depends largely on imported materials. Efforts are being made to change the situation. German and Italian companies are exploiting iron ore deposits in Portuguese India (Goa), which is now Italy's primary source.

Koppers Co., Pittsburgh, will complete a fourth blast furnace for Finsider's Ilva Works near Naples (at Bagnoli) by April, 1959. With a capacity of 1320 tons a day, it will be Italy's largest. Ilva is also adding a 1000-ton furnace at Piombino.

When the furnaces are completed, Italy will have a blast furnace capacity of 3,273,000 tons a year. Result: Decreased dependence on imported scrap and pig iron. Scrap imports, largely from the U. S., hit 2.8 million tons in 1957.

Italy has no coking coal and bought 3.5 million tons from the U. S. last year (at about $17.50 a ton) and about 1.3 million tons from Germany (at about $19 a ton). Finsider is organizing its own fleet to reduce dependence on foreign shipping. Discovery of large deposits of natural gas in the Po River Valley helped northern plants with fuel costs.

Italian plants are rounding out facilities to broaden product lines and reduce costs. Finsider's Cornigliano Works at Genoa added a Wean tinning line with an annual capacity of 110,000 tons. Over half of Italy's imported tin came from the U. S. Dalmine has a new line for making 30,000 tons of alloy tubing a year.

**Costs**—The squeeze between costs and selling prices is still a problem. Up to six months ago, Italian mills quoted prices 25 per cent higher than those of other European Steel & Coal Community countries. Prices are now lower but are still 10 to 15 per cent higher than those of other nations. The export market is also down. Concrete reinforcing bars are selling at $80 a ton, $20 under year-ago prices.

This is another in a series of on-the-spot reports of European metalworking by STEEL's editor-in-chief, Irwin H. Such. Beginning May 22, he will spend a month in Russia to gather material for special articles which will appear in STEEL.

# Scrap Upgraded New Way

## Secret process passes test at Houston. Armco president hails "Prolerizing" as major contribution to industry. Sheffield Div. signs for full output of plant

A PLANT which converts low grade scrap into high grade material has been placed in operation at Houston by Proler Steel Corp.

"Only 75 to 80 per cent of No. 2 bundled scrap is steel," says Izzie Proler, vice president and secretary-treasurer. "The rest consists of impurities which go off as slag in steelmaking. We believe the percentage of steel yield from our product is probably in the 90s."

Sheffield Div., Armco Steel Corp., contracted for the plant's entire output.

After watching a 45-minute trial run, R. L. Gray, Armco president, called the Proler process "the greatest contribution to the steel industry ever made by the suppliers of scrap."

**Secrecy**—Patents are pending in the U. S. and other Free World countries on the plant, its equipment and processes, and finished product.

Proler's secret process is a push-button operation centered on a control tower above a maze of conveyors, overhead cranes, and other equipment. One man controls the machinery.

Scrap is loaded into a 15 ft wide conveyor by a grapple-wielding crane. It moves up an incline into an enclosed area where the process begins. A junked car remains in the first machine only 15 seconds before emerging as a pile of fragments.

After fragmentation, the material moves through additional processes, including heat treatment. Conveyor belts carry it to two large hoppers. Into one flows steel ready for melting. Into the other goes rubbish (such as automobile door handles, strips of brass, copper wire, pieces of glass, ground rubber, and wood).

J. A. Street, manager of scrap purchases for the Sheffield Div., said after watching the process: "Rubbish and adulterants in bundles have always been headaches for steelmakers. Those disadvantages have been eliminated."

**Production**—Proler officials expect to have to draw scrap from a 500-mile radius to keep the plant in operation. Capacity production is not yet determined but is estimated at 500 to 1000 tons of processed scrap per day.

About 60 wrecked automobiles will make one carload of finished "Prolerized" steel.

## How Do You Tell Economic Truth?

DEMOCRATS and Republicans alike are clamoring for a better understanding of statistical measures of the recession.

Sen. Joseph Clark (D., Pa.) takes the Commerce Department to task for its method of presenting unemployment figures. The first release of the April statistics, he says, used gross figures: "Any high school student of economics knows that the gross figures on unemployment are relatively meaningless." Gross numbers showed a 78,000 drop in unemployed from March to April.

Seasonally adjusted totals, points out the senator, showed a rise of 372,000 in April. Such adjustments take account of a normal drop in unemployment in the spring, a rise in June, a decline through the summer and part of the fall, then a rise to a normal January peak.

Another view: Rep. Thomas Curtis (R., Mo.) thinks the "indiscriminate misuse of statistics by the gloom and doom prophets will continue to undermine the confidence of our people." He believes some of the unemployment comes from a cutback in the number of income producers in one family. Those who talk "gloom and doom," says Representative Curtis, fail to compare today's unemployment figures with those of 1930, 1949, and 1954 and don't like to refer to unemployment as a percentage of the employed.

## Call It a Tax Recession

In conclusion, Congressman Curtis characterizes our decline as a "tax recession." Business decisions have to be made on the basis of "tax consequences," he says, not "prudent economic judgment." The economy today is "a pinball type of operation where individuals and businesses are shooting for the zero per cent or the 25 per cent tax rate and seeking to avoid the 52 per cent or 91 per cent trap. They are not paying attention to economics."

Mergers and acquisitions are primarily for tax considerations, he claims.

Representative Curtis is one of the few House members prepared to demand tax revision immediately. He particularly favors better depreciation allowances for industry.

## Missile Decision Still To Come

Defense Secretary Neil McElroy contends that no final choice between the Jupiter and Thor has been made. Both are in production, although the Chrysler line for Jupiter is not up to the Douglas line for the Thor in terms of missiles produced or "production line" characteristics. Tests of both missiles are held up because of propulsion system bugs. So far, Mr. McElroy guesses the duplication of IRBMs has cost the U. S. Treasury over $100 million. The Thor is 30 to 60 days ahead of the Jupiter in development testing.

We also must make a choice between the Atlas and Titan, ICBMs, warns Mr. McElroy. He hinted that the Titan may get the nod over the Atlas, even though the Atlas will be expanded for future space work.

## Airways Modernization Is Closer

Fourteen proposals to establish a modern air traffic control system have been received by the Airways Modernization Board. Bidders include: Bendix Aviation, Federal Telecommunication Laboratories, GE, Hazeltine Corp., Hoffman Electronics, Hughes Aircraft, Melpar Inc., Motorola, RCA, Sperry Gyroscope, Stewart-Warner Corp., Raytheon, Stromberg-Carlson, General Precision Laboratory, and Tele-Dynamics. (Some are joint bids.)

Automatic Ground Air Communication Systems (AGACS) will eliminate vocal communication on routine messages.

Equipment will be tested in the New York area by late 1959; it could be operating in some places by 1962. Contracts will be awarded next month.

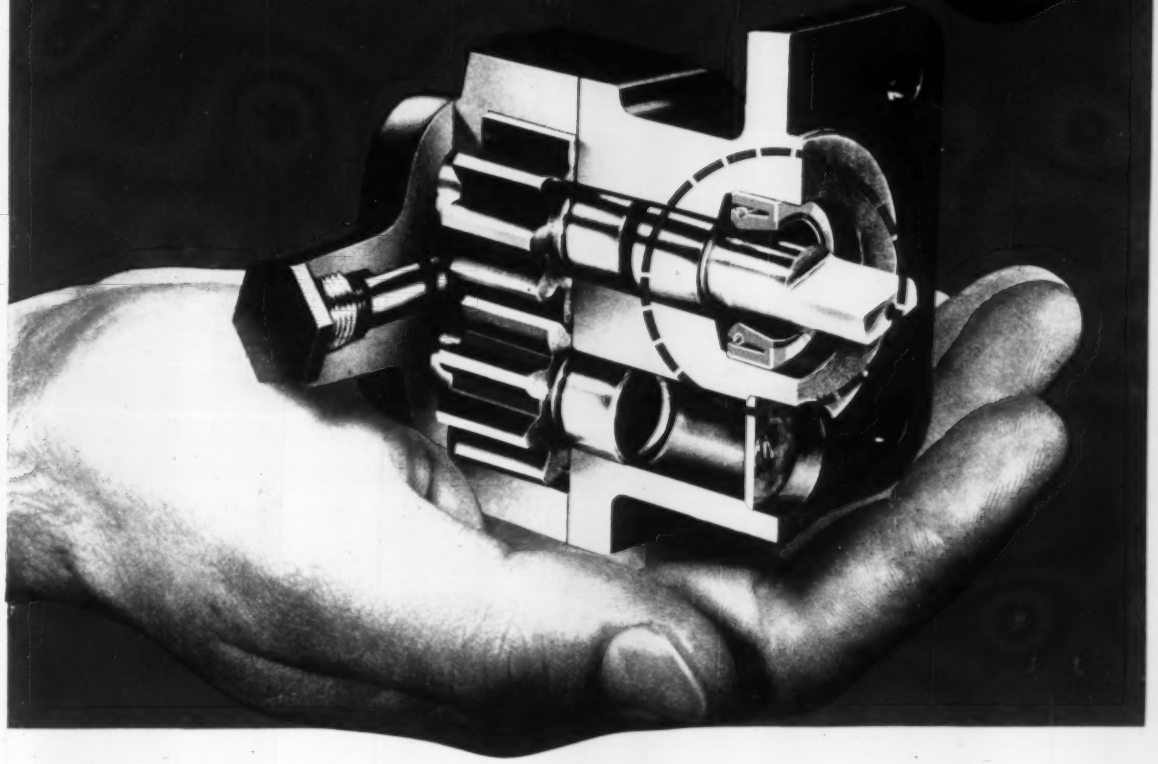
## COPE Spots Its Big Election Battles

A spokesman for the Associated General Contractors says several senators who are up for re-election this fall are branded "unfriendly" by the Committee on Political Education (COPE) of the AFL-CIO. Republicans named: Goldwater (Ariz.); Purtell (Conn.); Williams (Del.); Payne (Maine); Beall (Md.); Potter (Mich.); Thye (Minn.); Malone (Nev.); Bricker (Ohio); Revercomb and Hoblitzell W. Va.); and Barrett (Wyo.). The sole Democrat is Holland (Fla.).

## Steel Price Hike: Election Material

Washington observers of congressional investigations are prepared for a new round of politicking by the Democrats if a steel price boost comes in July. Sen. Estes Kefauver (D., Tenn.) is reportedly readying a new attack along the lines of his "administered price" investigation of last year. Rumors that President Eisenhower might renew his "go-slow" plea to both management and labor are also circulating. Many Republicans want Ike to lead them into the fall election battle with a series of speeches on the economy, stressing the long range outlook but not discounting the recession. A boost in steel prices would hurt the President's efforts tremendously, they feel.

# Champion performance in a fist-sized pump...sealed by C/R



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## Industry reacts, wants . . .

# Bold Action on Depreciation

**STEEL's mail continues to be unusually heavy because of correspondence about its pleas for depreciation reform as a means of fighting the recession (see Apr. 28 issue). STEEL's recommendations: Return to five-year amortization until June 30, 1959, while an industry-government commission has time to prepare for Congress' consideration a permanent, liberal depreciation system. Here's a sample of what some industrialists think of the proposals (for others, see May 12 issue, p. 49):**

**Roger M. Blough, chairman, U. S. Steel Corp., New York**—"STEEL deserves a lot of credit for its program on depreciation laws. It is axiomatic that all economic progress is based to a marked degree on the quantity and quality of tools supplied to workers. Inadequate depreciation allowances choke off funds needed for maintenance and modernization of production tools. A solution should allow an adjustment of depreciation equal to effects of inflation between the year of investment and the year in which the depreciation is to be taken."

**A. V. Bodine, president, Bodine Corp., Bridgeport, Conn.**—"There are some noninflationary things the government could do that would not cost it revenue in the long run. Congress could change the tax law (as STEEL suggests) to permit amortization of productive equipment in five years. It could establish tariffs or quotas on imports and could reinterpret the Buy American Act so that it will not be mandatory for the Defense Department to buy foreign machine tools when their prices are more than 6 per cent lower than those of comparable American models."

**H. H. Whitmore, vice president and general manager, Jones & Lamson Machine Co., Springfield, Vt.**—"Our antiquated depreciation laws are so unrealistic they have an oppressive effect on capital equipment replacement and expansion. We believe a realistic solution is found in the new 'Reinvestment Depreciation' concept submitted to the House Ways & Means Committee in January.

"There is no attempt to forecast replacement costs. These can be established only when replacements are made. The plan's sponsors also recognize that depreciable assets are seldom replaced with like kinds.

"When retirements of depreciable assets are made, original costs, dates of acquisitions, and costs of replacement expressed in current dollars would be determined. Current costs would be established by application to original costs of multiples related to purchasing power of the dollar in years in which such assets had been acquired. The difference between recorded original costs, and such costs expressed in current dollars, would be a permissible deduction from net operating income in the year the retirements were made, provided the taxpayer had, in that year, invested an equal or greater amount in other depreciable assets. If the amount spent for new assets did not equal the adjusted cost of the retirements, the excess could be used as a credit in subsequent years."

## Organizing for New Product Growth

**THERE'S no "one best way" for every company. But here's a concept that's gaining acceptance:**

**What Is It?**—It's a task force (normally three to five men) that guides new products through the stages of development. It's commonly called a new products committee, product planning department, or new products department.

**Who Heads It?**—"It should be headed up by either a marketing man with good knowledge of the technical side or a technical man with a thorough knowledge of marketing," says William Mogg, sales manager, special products, Cleveland Graphite Bronze Co., a division of Clevite Corp.

**What Is Its Status?**—It normally assumes a high staff position and reports to the company's chief executive, or top R&D officer, or top marketing executive.

**What Does It Do?**—Typical major responsibilities, say Booz, Allen & Hamilton, are:

- **Recommends new product objectives and program.**
- **Plans exploration activities.**
- **Screens new product ideas.**
- **Develops product specifications.**
- **Recommends which products should be developed.**
- **Investigates acquisitions.**
- **Co-ordinates testing and precommercialization.**
- **Directs interdepartmental teams in all stages.**

*Self-analysis plus market research will answer this question:*

# What Should You Make?

METALWORKING is calling on the marketing man to help solve one of its toughest problems: Planning profitable new products. Industry has the engineering, the facilities, and, in many cases, the money, for a successful program. Yet only one new product out of 50 placed on the market will be successful two years later, estimates one management consultant. A recent survey of 200 large, experienced companies showed that only one product in five makes the grade.

The problem: Firms go ahead with development programs before they have sufficient knowledge about the market.

Planning new products is like playing poker: The trick is knowing when to drop out. Says the management consulting firm, Booz, Allen & Hamilton: "You ante a lot of times before you develop a hand you are willing to run clear through to the final showdown. Like stud poker, the sure way to go broke is to string along for three or four cards each hand. You get a lot of action, but you dissipate your resources—and when you do finally get those aces back-to-back, you can't play them for all they're worth."

Industry loses money exploring and developing thousands of new product ideas that never reach the market stage. Commercial Chemical Development Association's survey of 20 chemical companies reveals: Of 540 proposed new products, only one was approved for commercialization. Eight reached the costly development stage.

**Plan of Attack**—Too often, product ideas get the green light before management realizes that they don't fit into the company's line. Needed are clearcut boundaries. You can find yours by analyzing:

- Abilities, interests, and experience of management.
- Technical skills.
- Limitations, flexibility, and potential of production facilities.
- Quality and availability of labor.
- Limitations, strong points, and feasible modifications of sales and distribution setup.
- Plant location with respect to markets.
- Service facilities.
- Raw materials—availability, cost, location, supply, transportation.
- Financial condition.
- Reputation with current and potential customers.
- Special competitive factors.

Thorough study of those areas should give you a set of standards against which new product ideas can be evaluated. You can avoid your company's weaknesses and capitalize on its resources—physical, human, and financial.

Company X made industrial brushes. It had an idea for a baby bottle brush. The chief engineer found it to be superior to similar brushes on the market. But well-advised management rejected the product after checking it against the company's standards. The firm had the necessary management ability, technical skills, labor, and production facilities, but it lacked a marketing structure that could be economically adapted to sell the new item. It also realized it was not well known by the people who would handle and buy the item (druggists and housewives).

In setting up your standards, you'll have to dig deep and remain

objective to get a true picture. That's why management consultants are often called in. They're impartial, experienced, can give the project their full attention, and are free from traditional company approaches.

**Scratching for Ideas**—Alert companies have programs for idea generation and an organized network to collect them. Marketing usually is in charge. Major sources of ideas include: 1. Market research—finding a need and tailoring a product to fit it. 2. Technological advances. 3. Employees' suggestions (see STEEL, Apr. 21, pp. 68-69). 4. Customers' inquiries. 5. Suppliers' suggestions. 6. Government agencies—search patents; check Small Business Administration's monthly *Products List Circular;* keep in touch with defense programs. 7. Business and trade publications. 8. Current trends—work in atomic energy, miniaturization, new metals, and missiles may suggest product ideas.

**Checking the Idea** — Warning: Keep idea evaluation separate from idea searching. In searching, quantity is important; in evaluation, quality is the watchword.

Each new product idea should be weighed against your set of standards. Those not "in bounds" should be discarded unless: 1. Their potential is great enough to warrant a change in company structure. 2. They can be profitably sold to another firm. 3. They show great enough growth potential to merit the farming out of development work, patenting the product, and licensing another firm to produce it.

Example: A small machine shop developed a tool for its own use. Market research determined that it was the best of its kind. But it was "out of bounds." The shop didn't have the production facilities nor the finances to make machine tools. So it licensed the idea to another company—at a good profit.

Priorities should be assigned to ideas that are kept so development work can be concentrated on the most practical ones—those showing highest potential payoff and lowest risk.

**Measuring Its Worth** — Here's where the marketing man plays a vital role. After a preliminary engineering evaluation shows the idea to be technically feasible, it's time to scout the market. (Or the two jobs can be done concurrently.) The primary objective of an initial market survey, asserts Spencer F. Martin Jr., manager, New England office, Arthur D. Little Inc., is to determine whether the risks involved warrant spending time, money, and effort on development (and to what extent.) He says it should cover:

- Estimated market potential and growth trends.
- Status of competition.
- Position of competing products and manufacturers.
- Importance of established market position.
- Danger of product obsolescence.
- Marketing channels and practices.
- Adaptability of present sales force.
- General characteristics required.

While it's important to uncover enough information to make a sound decision, you can carry the study too far. Says Mr. Martin: "There's often a tendency to prolong market research in the hope of reaching a completely definitive conclusion. not usually possible at this stage."

**Rechecking**—"Development must be a series of investigations and evaluations, increasingly detailed and critical, so that the idea has to pass more and more exacting tests," says Dr. Austin W. Fisher Jr., a former manager of Arthur D. Little's New England office. "Factors affecting product design must be further identified and clarified," adds Mr. Martin. "Market research at this stage should be directed to performance and design requirements, maintenance and reliability considerations, expected operating and environmental conditions, and trade or user practices."

Example: A machinery maker was developing equipment to employ a new machining technique. Prior to freezing the design and building the final prototype, market research was able to delineate specific performance characteristics. The new knowledge permitted: 1. A modification of the engineering approach. 2. Savings in development costs. 3. A better product. 4. Elimination of planned accessory equipment.

**Ready To Go?**—If the idea has met all marketing, technical, and financial tests, you're ready to design the product and manufacturing process, estimate capital needs, and make final cost, sales, and profit projections. But before you go into production or initiate a costly marketing campaign, you should pretest your product with consumers (see STEEL, Nov. 11, 1957, p. 70.)

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• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

# How Fawick Picked a Product

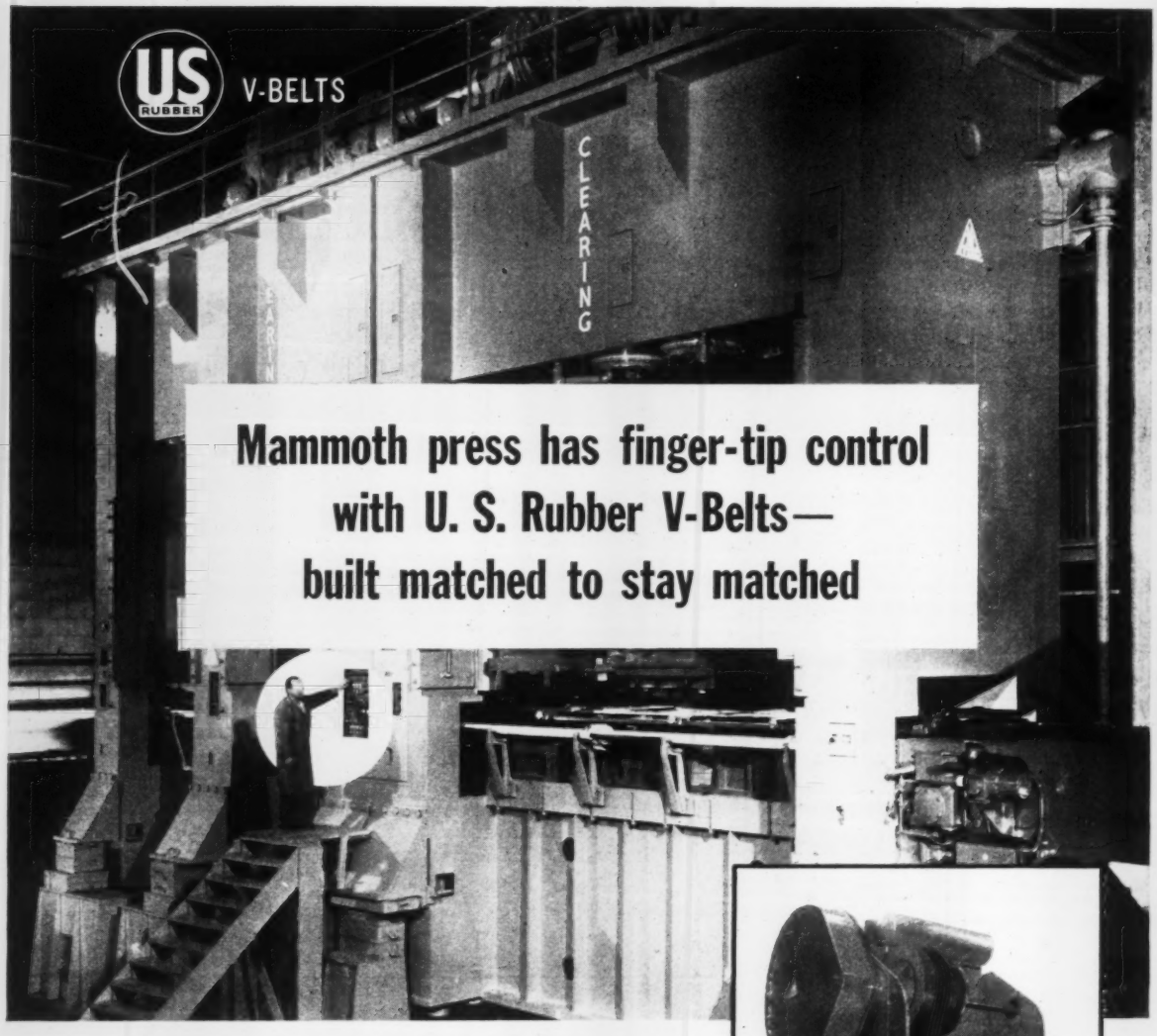
COMBINING "a look in the mirror" with good market knowledge, Fawick Corp.'s Fawick Airflex Div. developed a promising new product—an electric power transmission clutch.

A Cleveland producer of pneumatic clutches and brakes, Fawick needed that new product because of the trend to automation. (Automated machine tools need clutches operated by an electric impulse.)

A check of the potential market (applications range from machine tools to computers) showed these requirements: 1. Wide range of torque ratings. 2. Ability to operate in oil so it could be tucked inside transmissions. 3. Low residual torque. 4. Rapid response. 5. Low inertia on the driven end. 6. Interchangeability with existing units. 7. Compact size.

Coupled with that market research, a self-analysis convinced Fawick the new item could be made profitably. The firm had the necessary management skills (it hired one technical man and one marketing man), finances, location with respect to markets, and a good reputation in a directly related field. Labor and materials were available. Its sales and distribution structure could be readily modified. It would have to expand production facilities and buy machine tools. (The firm added 25,000 sq ft, including a testing laboratory.)

In production on a limited basis since late 1957, the new item's sales are termed "gratifying."

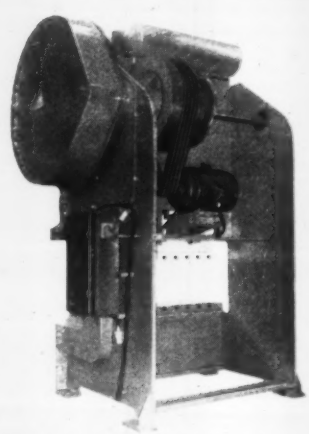



# Mammoth press has finger-tip control with U. S. Rubber V-Belts— built matched to stay matched

This triumph of press automation is believed to be the largest transfer feed press in the world. It was made by Clearing Machine Corp., Chicago, for General Electric's Home Laundry Department, Louisville, Kentucky. The press is 58′ long, more than 42′ high, and can produce tops for both G-E automatic washers and dryers without changing dies.

The tremendous shock loads transmitted by the press are controlled by 19-foot long U. S. Rubber V-Belts. Through a new method of construction, "U. S." belts of even this length—and longer—are produced to such close tolerances that there is no problem of matching belts for exacting response without lag or drag. That's one reason why these "U. S." belts stand up under the split-second movement of great forces . . . why they distribute the load to insure efficient pull with minimum stretch.

U. S. Rubber V-Belts are made in the world's largest and most modern plant devoted exclusively to the manufacture of endless belts. A complete line of belting—plus expert engineering assistance—is available at your "U. S." Power Transmission Distributor, or write us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

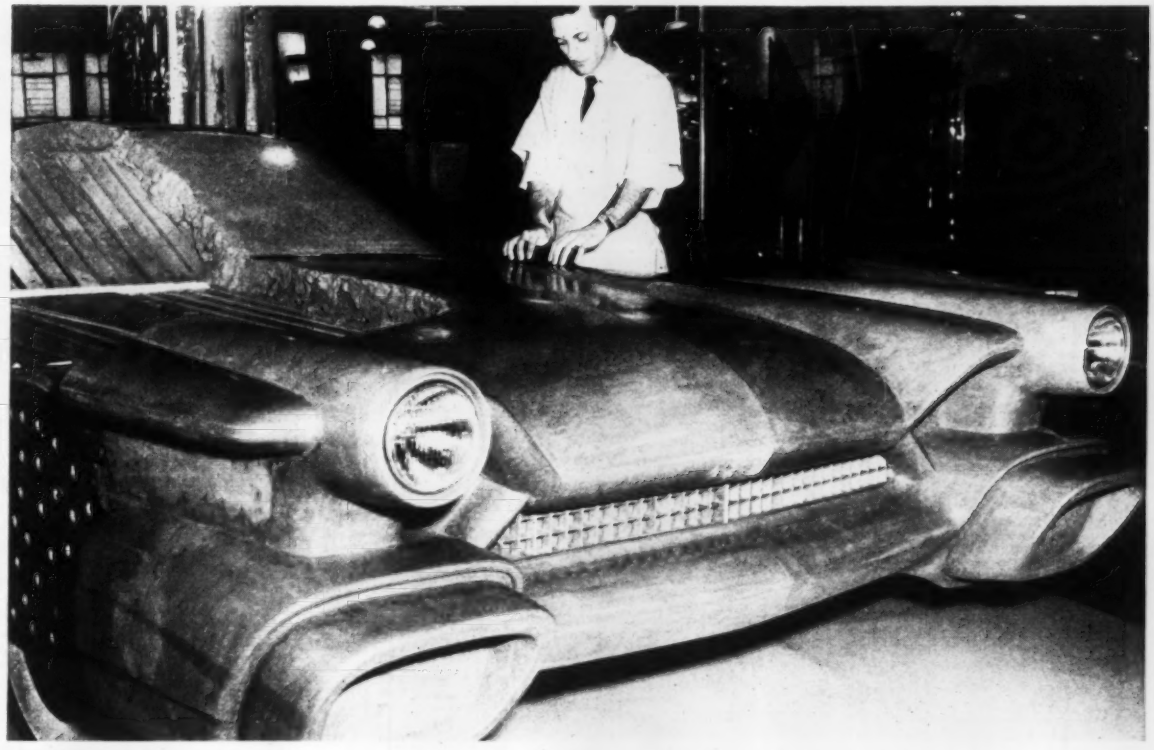


Close-up of smaller steel forming press. Thanks to an exclusive method of manufacture, a set of U. S. Rubber V-Belts like these can be picked right from stock with the guarantee that they will *match perfectly*. No testing necessary.

**Mechanical Goods Division**

# United States Rubber

See things you never saw before. Visit U. S. Rubber's New Exhibit Hall, Rockefeller Center, N. Y.



*John Ebejer of Ford works on a model of an "idea" car as...*

# Detroit Plans for '60, '61

DESIGN ENGINEERS and stylists have already forgotten about 1959 cars. They're working on mock-ups of 1960 and 1961 models. While plans still are subject to change, enough information is filtering down for auto suppliers to get some idea of what car builders will want during the next year.

Major facelifts for 1960s seem to be in the works at General Motors Corp. and Ford Motor Co. Chrysler Corp. hasn't made a final commitment on its unit body program. The big news on the '60s will be the introduction of a rear axle transmission and (probably) an aluminum engine block.

**Body Changes**—By using standardized components for all five lines, GM can make body changes every year if the market demands it. Ford now seems convinced a one-year program is necessary.

One reliable source says all GM lines will have new outer skins below the beltline for 1960. But unconfirmed sources contradict that, claiming that a completely new body for Chevrolet and Pontiac will be introduced in 1960 and that the other three lines will have all new exterior sheet metal below the beltline of the '59 basic body.

In 1961, GM may make two completely new shells — one for Chevrolet, Pontiac, Oldsmobile, and Buick and a larger one for Olds, Buick, and Cadillac lines. That doesn't refute GM's standardization program, but it does indicate that it will come slowly.

**Ford Motor Co.**—As indicated last week, Ford will introduce two completely new shells in 1959 which it originally planned to use through the 1960 season. But competition has forced it to move the '61 program ahead a year: Several sources report Ford will introduce new styles again in 1960.

Informants say two new bodies will be tooled for 1961. One will be shared by Ford and Edsel, the other by Mercury and Lincoln.

With the start of the 1960 model program, Lincoln cars will again be built in Mercury assembly plants. They'll no longer have unitized construction. Lincoln's Novi, Mich., assembly plant will be turned over to the Ford Div. to replace present Ford assembly operations in the Rouge, adds STEEL's source.

**Misleading?**—This may be trade talk, but there is some evidence to support it: Lincoln production costs on '58 models reportedly are $100 higher than the company aimed for. In addition, rumbles from several

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sources say the Ford Div. wants to close out its older Rouge facilities.

What doesn't add up: Lincoln's Novi plant was set up for unitized construction. It seems illogical to scrap that expensive tooling. There's also some question that the plant has enough capacity to handle a larger volume of Ford Div. cars. Conclusion: Ford hasn't made a definite decision and probably won't until it knows what production costs will be on '59 Lincolns.

**T-Bird**—From the same company source comes word that in 1960 Ford's Thunderbird will be discontinued in its present form and merged into the regular Ford line as a top-priced specialty item. The 1960 T-Bird will have more distinctive sheet metal of its own but will use most of the regular Ford's basic panels.

That is hard to believe because it reverses the original Thunderbird concept. It's also understood that the decision depends on whether Ford brings out a lower priced small car.

**Chrysler Corp.**—Unitized bodies in 1960 has been Chrysler's theme song for almost a year. The company wants to continue its body or body-and-a-half program for all lines. But now talk is leaking out of Chrysler that perhaps it will have to postpone unitized body plans for lack of money.

Operating capital seems to be adequate, though, and the best sources report Chrysler will still bring out the unit body in 1960 if it's at all possible. To carry the present body for a fourth year would be pushing its luck too far, and several company men say the firm definitely doesn't want to tool up for another nonunitized program that would run until '62 or '63.

## Transaxle To Make Debut

It now looks like GM will make a final commitment on the rear axle transmission within two or three months. Originally, it had been scheduled for limited production in 1960 and full usage in 1961, but engineering changes delayed it so long that 1961 seems to be the earliest it can get on the road.

GM reportedly has allocated $20 million to the Detroit Transmission Div. to tool up the Transaxle. In keeping with the standardization concept, the unit eventually is slated to be used on all GM lines.

Ford and Chrysler have similar developments underway. Reports are that Chrysler's job is still in the design stage. Ford has made more progress and can move into production almost as soon as GM, it is believed.

Another GM project is a low silhouette transmission only 8 in. in diameter, including all components, gear box converter, and controls, to be used with a sprung rear axle. That setup reportedly would take most of the driveshaft tunnel out of the passenger compartment.

Insiders say it's doubtful that it will pan out, but one way or another GM wants to eliminate the transmission hump by 1961. Cars are expected to get as low as they can go (probably around 51 in.) by the mid-1960s.

Such changes mean revamping the seating package of '61 and '62 cars. Motordom expects simplified seats—perhaps a shell, covered with form plastic. Bucket or individual seats (a la Thunderbird) will be appearing in luxury cars in the next two years.

## Aluminum Blocks on Way

The next major change in engines will be an aluminum block. As reported earlier (STEEL, Apr. 22, 1957, p. 59), GM is far ahead on aluminum block designs. Big question: Will the Chevrolet or Cadillac's Brougham get it first? Inside money seems to be on Chevy. The introduction date looks like '61, but it will be a long time before the blocks become standard.

Heavy front ends are a problem. By moving transmissions to the rear and leaving engines up front, car builders will be able to distribute weight more evenly. That necessitates long driveshafts, seemingly an easier problem to solve than those involving a rear mounted engine. Ford and Chrysler agree with that theory. Both are behind GM in developing lightweight engine blocks, but Ford is in a position to put a crash program into effect that could bring out an aluminum block by 1961.

**Economy**—The feeling is strong in Detroit that the public wants economical operation even more than small size. A new, 6-cylinder engine is scheduled for Chevrolet in 1960 or 1961 that will be aimed primarily at giving more miles to the gallon.

And because fuel injection potentially offers better fuel economy than carburetors, all companies are working to cut manufacturing costs and lick engineering bugs that have put it on the shelf.

GM still hopes to get the cost of its Rochester unit down around $45 in time for a 1960 comeback. Ford has similar hopes, and Chrysler is expecting Bendix to come across with a better and cheaper design. It's also casting about for other suppliers. (It has no plans to build its own.)

### U. S. Auto Output

Passenger Only

| | 1958 | 1957 |
|---|---|---|
| January | 489,357 | 641,591 |
| February | 392,112 | 571,098 |
| March | 357,049 | 578,826 |
| April | 316,503† | 549,239 |
| 4 Mo. Total | 1,555,021† | 2,340,754 |
| May | | 531,365 |
| June | | 500,271 |
| July | | 495,629 |
| August | | 524,354 |
| September | | 284,265 |
| October | | 327,362 |
| November | | 578,601 |
| December | | 534,714 |
| Total | | 6,117,315 |

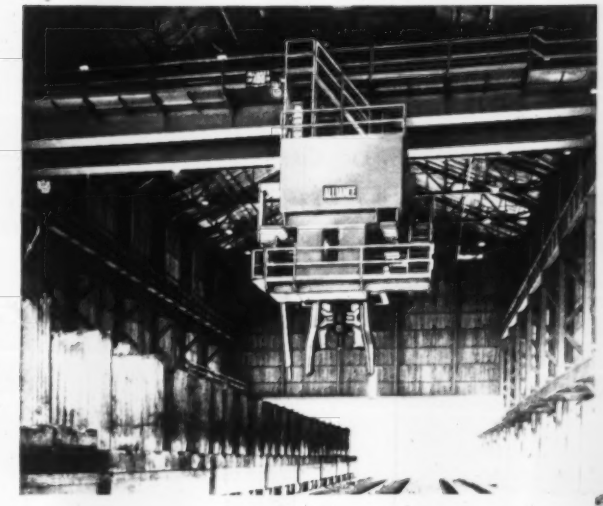
| Week Ended | 1958 | 1957 |
|---|---|---|
| Apr. 12 | 84,997 | 126,194 |
| Apr. 19 | 73,219 | 118,327 |
| Apr. 26 | 58,664 | 123,633 |
| May 3 | 78,434 | 119,999 |
| May 10 | 77,383† | 125,924 |
| May 17 | 75,000* | 127,390 |

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

## New Suspension Systems

As indicated last week, air suspension in 1959 models will be notable by its absence. Initial thinking, particularly at Chrysler and GM, is that air suspension is an interim step toward full hydraulic suspension systems. One of those companies hopes to get out a combination system on a limited basis by '62.

That means a central hydraulic system must be developed. Pontiac may bring out such a system in '60 and '61.



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the more you need HYATTS . . . because you get more sheer load-carrying capacity with straight cylindrical roller bearings than with any other type. HYATTS give outstanding service in this 400-ton stripper crane.

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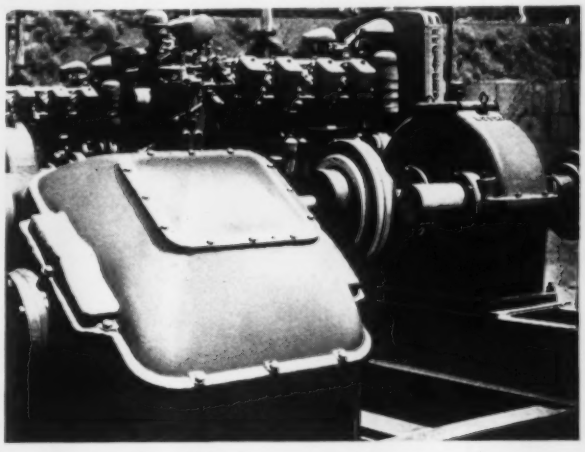
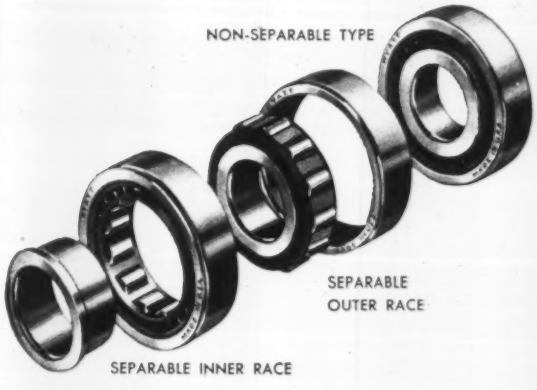
the more you need HYATTS . . . because carburized races, electronic control of eccentricity and internal clearances, and uncompromising final inspections assure smoother performance in speed reducers like this one.



## THE MORE YOU NEED *Cylindrical* HY-ROLL BEARINGS




Loads are growing heavier, speeds are growing higher in many types of machinery today—and at the same time designers must often *reduce* overall size. Here's where HYATT Hy-Rolls have it all over limited-capacity bearings—especially when you eliminate either inner or outer races of separable HYATTS and operate the rollers directly on the hardened and ground shafts or housing bores. It's a smart way to save added space without sacrificing load capacity. Ask your nearest HYATT Sales Engineer for recommendations.
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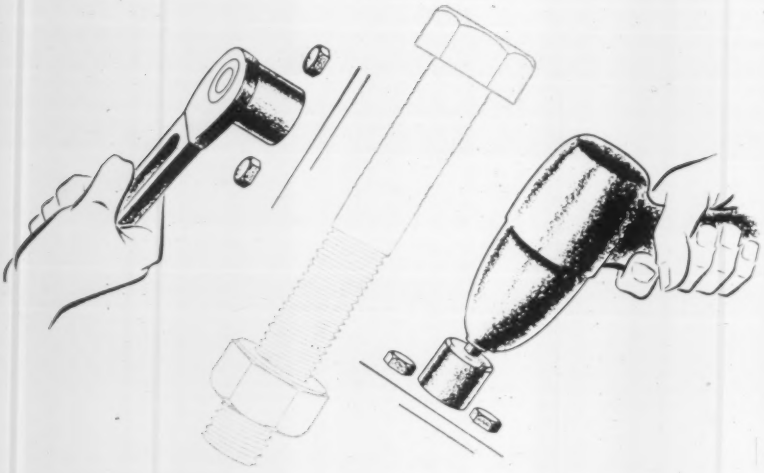


# TIGHTEN UP FASTENERS TO TIGHTEN DOWN ON COSTS

- **Too little tightening wastes fasteners' strength—invites failures**
- **Proper application saves on material and production costs**

Go the limit in tightening bolts. You'll find this not only more economical, but safer too. For the strength of a rigid connection depends not on how strong a bolt is, but rather on how much *clamping force* it exerts when tightened.

**Example:** A bolt good for 20,000 pound load is tightened to just 5,000 pounds tension. Believe it or not, *joint* strength from that bolt would be only 5,000 pounds.

**Case History:** Earthmover's bucket kept coming loose. Bolts were upgraded progressively, finally to alloy steel and to $1\frac{1}{4}$-inch size . . . to no avail. Trouble was they still were not being adequately tightened. Bigger wrench, more torque and standard $\frac{3}{4}$" RB&W high tensile bolts stopped problem, saved money.

Obviously, the more of the fastener's strength you use, the smaller it can be. That's why RB&W High Tensile Bolts are such good buys. They have more strength to give. They cost less than the larger machine bolts or bright cap screws they can replace. Moreover, smaller bolts mean smaller holes to drill or tap. Smaller holes can often mean reduction in size of fastened members.

For a penetrating, productive value analysis of your fastening operations, make use of an RB&W Fastener Man. You may be surprised at the cost cutting his experience makes possible. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

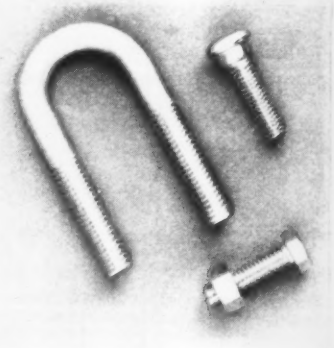
R B&W
113th year

**Plants at:** Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Fargo. **Distributors from coast to coast.**

## Economical lock nut

Staking opposite sides of these RB&W acorn nuts deforms threads for a positive grip. It also puts middle of nuts slightly out-of-round, for a spring tension locking effect. They're designed for applications such as outdoor furniture, where anchoring fasteners is more important than solid seating. Available in aluminum, steel, silicon bronze.

These all-metal nuts can also be furnished in double chamfered style. Since they lock with their middle threads, they can be turned onto screw from either side.

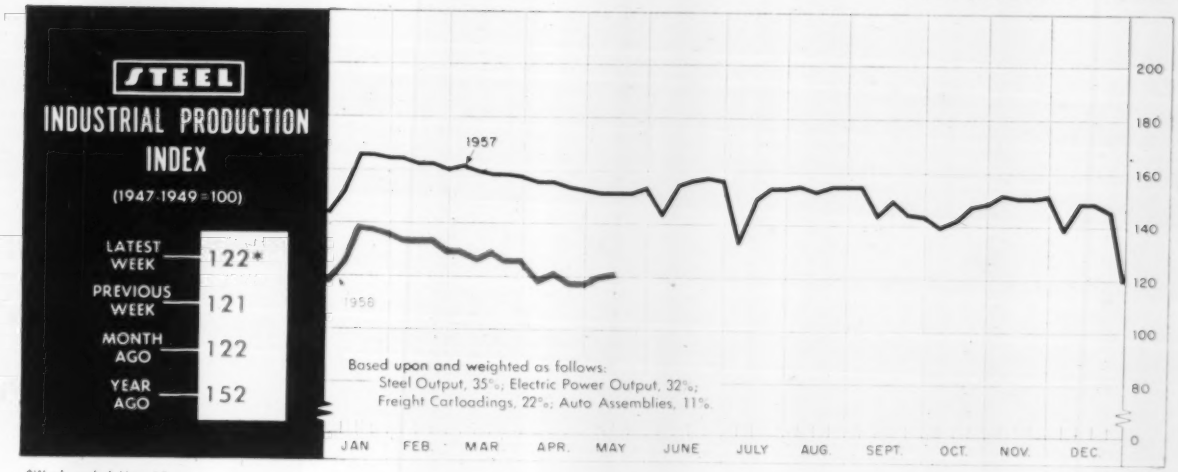


## Silicon bronze fasteners combine desirable features

Silicon bronze offers the highest conductivity in fasteners able to withstand high stresses. It resists corrosion, stays free from season cracking, too. It makes ideal fasteners for electrical use where tensile strength is important; or for corrosive environments.

One of the first to develop such fasteners, RB&W cold works them for tensile strength and for clean, well formed threads that don't seize. Oval bolts, hex bolts and nuts, and U bolts available. Specials can be developed.

RB&W FASTENERS—STRONG POINT OF ANY ASSEMBLY




*Week ended May 10.

# Recession: The Worst Is Over

THE BOTTOM of the recession is past. Business is firming up although the spring pickup will be slight compared with those of some past years.

It is believed that the economy will bounce along the trough for a few months and that there will be a slight tendency for the ups to be greater than the downs.

**Evidence** — Exhibit No. 1 is STEEL's industrial production index (above). Climbing to a preliminary 122 (1947-49=100) for the week ended May 10, it has recovered 4 percentage points in two weeks, the best showing so far this year. Fairly well established trends in the components of the index point to a further slight rise this spring. It will be interrupted later by Memorial Day and the Fourth of July, but there are no indications that the economy will go any lower than it was during April until the auto companies close down for model changeovers.

**Upward Forces** — Steel operations played a significant role in the improvement. Most steelmakers believe there may be minor dips in the next few weeks, but the general trend will be up at a slow pace until the third quarter. The three major customers of the mills—construction, automakers, and warehouses—are stepping up their buying.

The second factor in the rise has been a counterseasonal firming in output of electricity. Consumption of this basic commodity is normally weakened by a change to daylight saving time. But since hitting a low point in mid-April, output of electric energy has increased close to 100 million kw-hr.

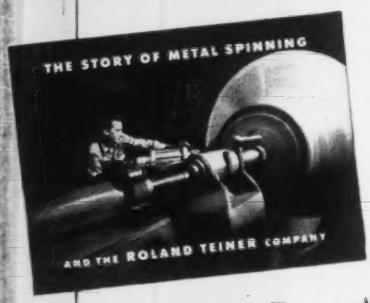
By merely holding level for a couple of weeks, the auto industry has helped firm the business trend. Production of trucks and cars during the week ended May 10 was off only slightly (94,683 units, according to *Ward's Automotive Reports*) from the previous week's level. With sales slightly more than production, it appears automakers are content

## BAROMETERS OF BUSINESS

| | LATEST PERIOD* | PRIOR WEEK | YEAR AGO |
|---|---|---|---|
| **INDUSTRY** | | | |
| Steel Ingot Production (1000 net tons)[2] | 1,400[1] | 1,334 | 2,155 |
| Electric Power Distributed (million kw-hr) | 11,200[1] | 11,251 | 11,311 |
| Bituminous Coal Output (1000 tons) | 6,360[1] | 6,800 | 9,620 |
| Crude Oil Production (daily avg—1000 bbl) | 6,250[1] | 6,227 | 7,434 |
| Construction Volume (*ENR*—millions) | $380.6 | $485.6 | $385.2 |
| Auto, Truck Output, U. S., Canada (*Ward's*) | 104,453[1] | 105,776 | 160,100 |
| **TRADE** | | | |
| Freight Carloadings (1000 cars) | 530[1] | 533 | 723 |
| Business Failures (Dun & Bradstreet) | 336 | 329 | 297 |
| Currency in Circulation (millions)[3] | $30,659 | $30,518 | $30,589 |
| Dept. Store Sales (changes from year ago)[4] | −8% | +4% | +6% |
| **FINANCE** | | | |
| Bank Clearings (Dun & Bradstreet, millions) | $24,456 | $24,019 | $22,506 |
| Federal Gross Debt (billions) | $275.1 | $275.1 | $273.7 |
| Bond Volume, NYSE (millions) | $24.2 | $26.4 | $19.9 |
| Stocks Sales, NYSE (thousands of shares) | 14,104 | 12,434 | 12,068 |
| Loans and Investments (billions)[4] | $92.5 | $92.1 | $87.1 |
| U. S. Govt. Obligations Held (billions)[4] | $30.5 | $30.1 | $26.0 |
| **PRICES** | | | |
| STEEL's Finished Steel Price Index[5] | 239.15 | 239.15 | 228.59 |
| STEEL's Nonferrous Metal Price Index[6] | 197.1 | 196.9 | 232.8 |
| All Commodities[7] | 119.5 | 119.3 | 117.2 |
| Commodities Other than Farm & Foods[7] | 125.6 | 125.6 | 125.4 |

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1958, 2,699,173; 1957, 2,559,490. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1926-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

# BROCHURE

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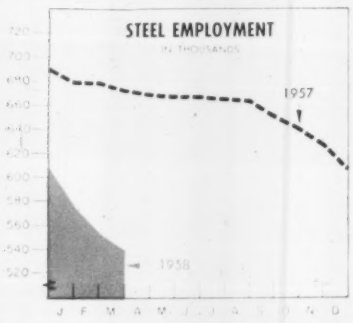
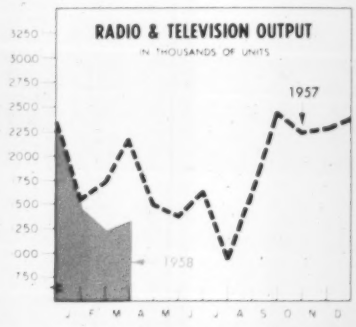
## THE BUSINESS TREND




| | Employment in Thousands 1958 | 1957 | Payroll in Millions 1958 | 1957 |
|---|---|---|---|---|
| Jan. | 575 | 678 | $297.4 | $360.4 |
| Feb. | 554 | 677 | 261.7 | 327.5 |
| Mar. | 539 | 671 | 271.8 | 344.2 |
| Apr. | ... | 668 | ... | 331.5 |
| May | ... | 666 | ... | 338.0 |
| June | ... | 666 | ... | 324.8 |
| July | ... | 665 | ... | 334.6 |
| Aug. | ... | 663 | ... | 343.7 |
| Sept. | ... | 651 | ... | 330.1 |
| Oct. | ... | 640 | ... | 345.6 |
| Nov. | ... | 626 | ... | 316.3 |
| Dec. | ... | 606 | ... | 299.6 |

American Iron & Steel Institute.
Charts copyright, 1958, STEEL.

| | Radio 1958 | 1957 | Television 1958 | 1957 |
|---|---|---|---|---|
| Jan. | 1,027 | 1,086 | 434 | 450 |
| Feb. | 878 | 1,265 | 370 | 465 |
| Mar. | 931 | 1,609 | 417 | 560 |
| Apr. | ... | 1,116 | ... | 361 |
| May | ... | 1,024 | ... | 342 |
| June | ... | 1,088 | ... | 544 |
| July | ... | 613 | ... | 360 |
| Aug. | ... | 966 | ... | 674 |
| Sept. | ... | 1,611 | ... | 833 |
| Oct. | ... | 1,569 | ... | 662 |
| Nov. | ... | 1,689 | ... | 575 |
| Dec. | ... | 1,793 | ... | 574 |
| Totals | ... | 15,429 | ... | 6,400 |

Electronic Industries Association.

to hold to present schedules and watch inventories dwindle. Early introduction of '59s will add strength to the economy this summer.

**Future Strength** — Stability has been the keyword in the freight carloading situation. Now holding at the 530,000-car level, railroaders expect iron ore shipments to push loadings up a bit. (The first boats have docked.) But this factor probably won't be as strong as it has been in previous years because ore stocks are heavy and steelmaking operations are down.

Aside from STEEL's index, other plus signs have appeared in number. Steelmakers say that warehouses are coming in with some "fantastic" orders, requiring shipment almost immediately. "This indicates to us that their inventories are badly imbalanced," says one. "The orders right now are plentiful, though small, and inquiries have jumped tremendously in the last two weeks."

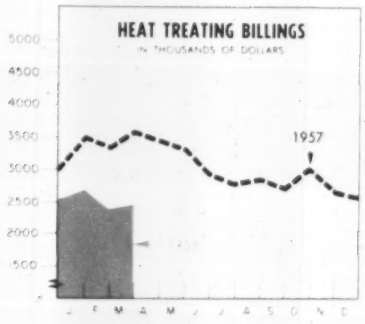
**Bellwether**—Scrap quotations are firmer than they have been in months. Such activity usually presages an upturn in steelmaking operations. With the notable exception of the West Coast, most areas report that scrap prices have either gone up or held firm after weeks of continuous decline.

Construction is entering its prime season, and from the latest reports it will be the best over-all construction year in history. Not only is work put in place running at record levels, but contracts for future construction are resurging. *Engineering News-Record* reports that April's awards topped those of March by 13 per cent. The total volume of $1.6 billion was also 8 per cent higher than the figure for April, 1957.

**Partmakers Optimistic** — Reports from small shops making components are also on the bullish side for a change (see Page 85). Makers of screw machine products feel that the worst is past. Tool and die makers are encouraged by the volume of business coming in from automotive companies for early introduction of 1959 models. Makers of electrical parts, such as relays and printed circuits, report an improvement.

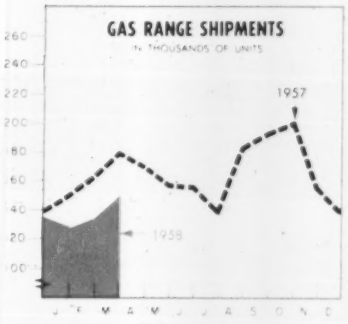
Even the nonferrous industry is breathing easier as its business stabilizes or improves slightly (see STEEL, May 12, p. 142).

**More Workers**—Such activity indicates employment will increase as spring blossoms out. An encouraging sign in this direction is the fact that new claims for unemployment




| | 1958 | 1957 | 1956 |
|---|---|---|---|
| Jan. | 2,780.4 | 3,533.9 | 3,116.4 |
| Feb. | 2,436.4 | 3,378.9 | 3,124.8 |
| Mar. | 2,495.4 | 3,631.8 | 3,330.9 |
| Apr. | ..... | 3,462.6 | 3,166.2 |
| May | ..... | 3,311.4 | 3,350.7 |
| June | ..... | 2,912.1 | 3,094.5 |
| July | ..... | 2,767.5 | 2,737.4 |
| Aug. | ..... | 2,830.8 | 3,136.6 |
| Sept. | ..... | 2,708.8 | 2,858.6 |
| Oct. | ..... | 3,021.6 | 3,468.5 |
| Nov. | ..... | 2,641.4 | 3,238.2 |
| Dec. | ..... | 2,565.4 | 2,998.9 |

Metal Treating Institute.




| | Shipments—Units | | |
|---|---|---|---|
| | 1958 | 1957 | 1956 |
| Jan. | 128,400 | 149,600 | 163,500 |
| Feb. | 134,500* | 161,600 | 190,200 |
| Mar. | 150,000* | 179,400 | 194,300 |
| Apr. | ..... | 168,800 | 176,300 |
| May | ..... | 156,200 | 179,400 |
| June | ..... | 155,300 | 185,100 |
| July | ..... | 137,400 | 158,800 |
| Aug. | ..... | 182,600 | 203,200 |
| Sept. | ..... | 192,100 | 206,400 |
| Oct. | ..... | 195,500 | 219,100 |
| Nov. | ..... | 154,300 | 161,100 |
| Dec. | ..... | 135,800 | 138,700 |
| Totals | ..... | 1,970,900* | 2,176,100 |

*Preliminary.
Gas Appliance Mfrs. Assn.

benefits edged down in the first week in May for the second consecutive period. Between mid-March and mid-April, unemployment declined 78,000, say the Commerce and Labor Departments. Employment rose by 600,000 in that period. But manufacturing employment continued to drop, with about 70 per cent of the 271,000 decline coming in durable goods plants—emphasizing that this is a hard goods recession.

## Predicts Boom Years

If you think Detroit has lost the knack of selling, take cheer from Henry H. Heimann, executive vice president of the National Association of Credit Men, New York. He believes we will see a 10 million car year in the next decade.

Mr. Heimann lists some possible changes during the years ahead: "Cars will be built more in keeping with highway facilities. Designs will have to give consideration to zooming cost of auto repairs. The trend may be toward less power in cars."

There's good news for homebuilders, too. Mr. Heimann thinks home starts will mount to 1.5 million within the next ten years.

## Stocks and Sales Dip

Inventories and sales continued to decline in March, the Commerce Department reports. The department estimates value of manufacturing and trade inventories at the end of that month at $89.3 billion, about $1.7 billion lower than the March, 1957, value. The March decline in stocks was more than $700 million. The reduction was about equal to previous two months.

March sales of retail stores are estimated at $15.6 billion. That's a decline of 1 per cent in one year. Wholesale sales of $10.2 billion in March amounted to a 1 per cent decline.

## Trends Fore and Aft

• Here's how Henry J. Kaiser, chairman, Kaiser Aluminum & Chemical Corp., Oakland, Calif., views demand for aluminum: "We hold to our forecast of three years ago that U. S. consumption will rise to 200 per cent of present capacity, climbing to 4 million tons by 1965."

• Manufacturing firms hired 23 persons for every 1000 on payrolls in March, while 31 workers were laid off for every 1000, says the Labor Department.

Tensile anyone?

Somers is game

If tensile strength of thin strip is a critical requirement of your present or anticipated production, Somers Brass will be glad to serve.

Nearly 50 years of experience with thin gauge brass, nickel, copper and alloys, plus complete laboratory facilities are available, without cost or obligation to you, to solve your problems in tensile strength, dimensions, temper and other properties.

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Why not call your Brainard representative (we are in the yellow pages of all major cities). He will give you information on Brainard's complete line. He will be glad to demonstrate tools and in some cases supply a test coil of Brainard's top quality steel strapping.

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# Brainard Steel Strapping

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*BRAINARD STEEL DIVISION OF* **SHARON STEEL CORPORATION**

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LLOYD G. BACKART
*Rapistan-Keystone president*

GEORGE J. BARRETT
*Miller & Van Winkle post*

EDWIN B. JAMES
*McKay Machine v. p.-sales*

LOUIS A. DePOLIS
*LeTourneau-Westinghouse v. p.*

**Lloyd G. Backart** was elected president, **Rapistan - Keystone Co. Inc.**, Detroit, an affiliate of Rapids-Standard Co. Inc. He was vice president of the Detroit firm and continues to serve as sales manager. **William Koning** was elected vice president; **Nathan C. Snyder**, secretary; **Eugene L. Hummel**, treasurer. Mr. Koning also will serve as general manager.

**George J. Barrett** was appointed executive vice president and general manager, **Miller & Van Winkle Co.**, Paterson, N. J. He was with Kearfott Inc.

**Edmund Pfeifer**, manager of fabrication sales, **Lukens Steel Co.**, Coatesville, Pa., will become director of purchases, effective June 1. **E. C. Book**, purchasing agent for the last four years, will serve in an advisory capacity until retirement June 30, 1959. **Albert W. Gudal** was made purchasing agent.

**Jerome A. Gottschalk** was appointed director of sales for **Christy Co.**, Fremont, Ohio.

**Kenneth W. Sward** was elected vice president and director of engineering, **Detroit Harvester Co.**, Detroit. He was manager of Danville Products Inc., subsidiary at Danville, Ill., and is succeeded by **H. A. Consor. Frederick C. Purdy** was made director of manufacturing for Detroit Harvester. He was chief industrial engineer.

**A. W. Hartig** was named manager of **Chrysler Corp.**'s axle and transmission division, Detroit.

**Edwin B. James** was appointed vice president-sales, **McKay Machine Co.**, Youngstown. He was general sales manager.

**Robert J. Sloan** was elected president, **Crouse-Hinds Co.**, Syracuse, N. Y. He succeeds **J. R. Tuttle**, who continues as chairman.

**W. Gould Jones** was elected vice president-sales, **Russell, Burdsall & Ward Bolt & Nut Co.**, Port Chester, N. Y. He succeeds **Harry O. McCully**, elected senior vice president, continuing actively in formulation of sales policies.

**L. G. Porter** was elected president and general manager, **Long Mfg. Div.**, Borg-Warner Corp., Detroit, and **Long Mfg. Co. Ltd. of Canada**, a subsidiary. Mr. Porter is also executive vice president of Borg-Warner. He succeeds **T. J. Ault**, who resigns July 1 to become president of Saco-Lowell Shops. **Harry H. Whittingham** will become assistant general manager, Long Mfg. Div., in addition to continuing as its vice president.

**Louis F. Fow** joined **Cooper Alloy Corp.**, Hillside, N. J., to fill the new post of sales supervisor for its foundry products division. He was formerly with Lebanon Steel Foundry and Misco Precision Casting Co.

**United Shoe Machinery Corp.** appointed **Howard L. Horte** manager of its United Shank & Findings Co. branch, and Metal Stampings Div. at Whitman, Mass. He also assumes direction of United Shank's branch at Plymouth, N. H.

**Louis A. DePolis** was named vice president - marketing for **LeTourneau-Westinghouse Co.**, Peoria, Ill. He was director of sales, industrial truck division, Clark Equipment Co.

**M. A. Tardiff** was made manager, general equipment sales, **Hanson-Van Winkle-Munning Co.**, Matawan, N. J. He had been general equipment sales engineer with the J. C. Miller Div., Grand Rapids, Mich.

**Carl E. Pfeiffer** was elected a vice president, **Michigan Seamless Tube Co.**, South Lyon, Mich. He continues as general manager of Gulf States Tube Corp., subsidiary at Rosenberg, Tex.

**Charles G. Thomas** was made acting manager of purchases for **Dresser Mfg. Div.**, Dresser Industries Inc., Bradford, Pa. He assumes the post vacated by **Robert D. Crane**, appointed assistant director of purchases for **Dresser Industries Inc.**, Dallas.

**Don Davidson** fills the new post of manager of marketing at **Mueller Climatrol**, Milwaukee, division of Worthington Corp. He was field sales manager. **Richard B. Schmidt**, formerly sales promotion manager, was made sales manager for all Mueller products.

**Thomas L. Denney** was made general sales manager, **Garlock Packing Co.**, Palmyra, N. Y. He was special assistant to the vice president-marketing.

**John Baur** was elected vice presi-

KENNETH D. STODDART
*Copperweld Steel p. a.*

BRUCE BRIGGS
*Kraeuter & Co. v. p.*

FRED J. KIRKMAN
*Burgess Battery president*

HUBERT L. BILLS
*Acme Steel exec. v. p.-planning*

dent-engineering and research, **Binks Mfg. Co.**, Chicago.

**Kenneth D. Stoddart** was appointed purchasing agent, **Copperweld Steel Co.**, Warren, Ohio. He was assistant purchasing agent.

**Bruce Briggs** was elected vice president-general manager, **Kraeuter & Co. Inc.**, Newark, N. J.

**Arthur Macfadyen** was appointed chairman and senior officer of **Page-Hersey Tubes Ltd.**, Toronto, Ont. He is succeeded as president and general manager by **W. Ewart Bannerman. C. F. Anderson**, former vice president-operations, was appointed executive vice president and assistant general manager, and is now in Toronto. **C. W. Morehead**, general works manager at Welland, Ont., was made vice president-general works manager. **G. G. Taylor**, general sales manager, was made vice president-sales. **J. B. Lindner**, general purchasing agent, was made vice president-purchasing. **L. V. Sutton**, a director and member of the executive committee, was elected a vice president.

**Fred J. Kirkman** was elected president, **Burgess Battery Co.**, Freeport, Ill. He was executive vice president and general manager. Mr. Kirkman succeeds **Dan W. Hirtle**, who was elected to the new post of vice chairman.

**J. Haydn Harris** was named vice president, **Weirton Steel Co.**, Weirton, W. Va., division of National Steel Corp. He continues as treasurer.

**White Motor Co.**, Cleveland, elected **Z. C. R. Hansen** executive vice president-general manager of its Diamond T Div., Chicago, acquired Apr. 1. **William F. Burrows** was appointed vice president-general manager, Diesel Engine Div., Springfield, Ohio.

**Westinghouse Electric Corp.**, Pittsburgh, elected three vice presidents: **John W. Simpson**, manager of the Bettis Atomic Power Div.; **Richard J. Sargent**, marketing and distribution manager, consumer products; and **Thomas P. Jones**, manager of the Atlantic region sales, apparatus products division.

**Hubert L. Bills** was elected executive vice president for organizational planning at **Acme Steel Co.**, Chicago. He was vice president of industrial relations.

**General Steel Castings Corp.** appointed **W. Ashley Gray Jr.** western sales manager; **Lawrence P. White**, eastern sales manager for railroad products and industrial castings. Mr. Gray is at Granite City, Ill., Mr. White at Eddystone, Pa.

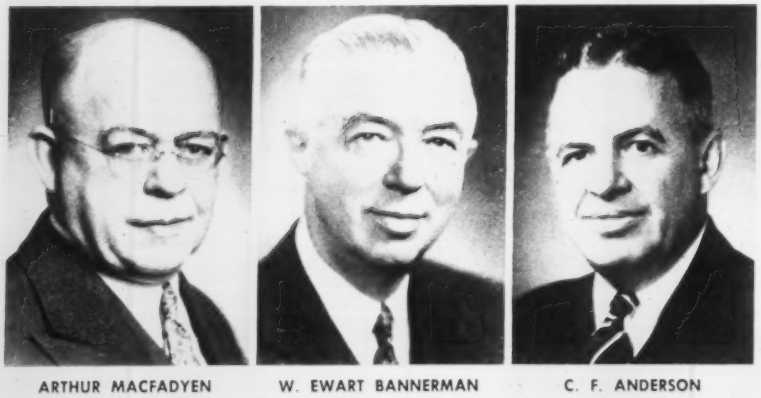
**M. M. Hedges Mfg. Co. Inc.**, Chattanooga, Tenn., appointed **Fred C. Holbrook** vice president. He was sales manager. **T. I. Mastin**, former chief engineer, becomes vice president-engineering and production. **E. D. White** was made sales manager.

**William F. Zunker** was appointed sales manager, industrial boiler division, **Cleaver-Brooks Co.**, Milwaukee.

**North American Refractories Co.**, Cleveland, appointed **Fred W. Schroeder** director of research; **Robbert A. Moffett**, director of technical service.

**Robert C. Friedly** and **Harold A. Hallstein Jr.** were appointed product sales managers, **Nelson Stud Welding Div.**, Gregory Industries Inc., Lorain, Ohio. Formerly the regional managers at Chicago and Cleveland, they will co-ordinate field promotion and sales on special programs, primarily on construction applications.

**Richard E. Clay** succeeds **Fred H. Edgar** as manager of automotive sales, aluminum division, **Olin Mathieson Chemical Corp.** Mr. Edgar will devote full time to duties as sales manager, Great Lakes re-



ARTHUR MACFADYEN  W. EWART BANNERMAN  C. F. ANDERSON

*executive appointments at Page-Hersey Tubes Ltd.*

# Columbia Tool Steels for 1958
# with A.I.S.I. Identification and Type Classification of Tool Steels

## HIGH SPEED TOOL STEELS
## MOLYBDENUM BASE — TYPE SYMBOL M

| GRADE | Type | C | Mn | Si | Cr | Ni | V | W | Mo | Co | Cb |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Identifying Elements, in Per Cent | | | | | | | | | |
| MOLITE | M1 | .80 | — | — | 4.00 | — | 1.00 | 1.50 | 8.00 | — | — |
| | M2 | .80 | — | — | 4.00 | — | 2.00 | 6.00 | 5.00 | — | — |
| MOLITE SMOOTHCUT† | M2 | .80 | — | — | 4.00 | — | 2.00 | 6.00 | 5.00 | — | — |
| MOLITE 3 | M3 | 1.00 | — | — | 4.00 | — | 2.70 | 6.00 | 5.00 | — | — |
| | M4 | 1.30 | — | — | 4.00 | — | 4.00 | 5.50 | 4.50 | — | — |
| | M6 | .80 | — | — | 4.00 | — | 1.50 | 4.00 | 5.00 | 12.00 | — |
| | M7 | 1.00 | — | — | 4.00 | — | 2.00 | 1.75 | 8.75 | — | — |
| | M8 | .80 | — | — | 4.00 | — | 1.50 | 5.00 | 5.00 | — | 1.25 |
| | M10 | .85 | — | — | 4.00 | — | 2.00 | — | 8.00 | — | — |
| | M15 | 1.50 | — | — | 4.00 | — | 5.00 | 6.50 | 3.50 | 5.00 | — |
| | M30 | .80 | — | — | 4.00 | — | 1.25 | 2.00 | 8.00 | 5.00 | — |
| | M34 | .90 | — | — | 4.00 | — | 2.00 | 2.00 | 8.00 | 8.00 | — |
| | M35 | .80 | — | — | 4.00 | — | 2.00 | 6.00 | 5.00 | 5.00 | — |
| | M36 | .80 | — | — | 4.00 | — | 2.00 | 6.00 | 5.00 | 8.00 | — |

†With smooth cutting free machining additives

Fifth of a Series of A.I.S.I. Tool Steel Type Classifications.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Detroit 3, 121 Oakman Blvd., Phone TUlsa 3-3770
Los Angeles 22, 6955 E. Bandini Blvd., Phone RAymond 3-4684
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TOOL COLUMBIA STEELS

# COLUMBIA TOOL STEELS

HIGH SPEED STEELS: Clarite — Vanite — Carvite — Acmite — Cobite — Maxite DIE STEELS: Superdie — Atmodie — Atmodie Smoothcut — E-Z-Die Smoothcut — Oildie — Exl-Die — Framdie HOT WORK STEELS: Clarite HW — Formite No. 3 — Formite No. 2 — Molite HW10 — Vanadium-Firedie — Alcodie — Firedie SHOCK RESISTING STEELS: Buster Alloy — CEC Smoothcut CARBON TOOL STEELS: Columbia Special — Vanadium Extra — Waterdie Extra — Columbia Extra — Columbia Extra Headerdie — Vanadium Standard — Waterdie Standard — Columbia Standard — Columbia Electrex

JOHN A. BACKSTROM
*Palmer Tool & Forging post*

R. E. PERSOHN
*gen. mgr. A-C Gadsden Wks.*

ERIC FOOTE
*Diversey v. p.-manufacturing*

MAURICE LANG
*heads Yardney Primary div.*

DON A. BECKENBAUGH
*J. I. Case sales-mfg. adm.*

FRANK R. MILLIKEN
*Kennecott Copper exec. v. p.*

gion. Both have headquarters in Royal Oak, Mich.

**Maurice Lang** joined **Yardney Electric Corp.**, New York, as head of its primary battery division. He was with U. S. Electric Corp.

**Don A. Beckenbaugh** fills the new post of sales and manufacturing administrator for **J. I. Case Co.**, Racine, Wis. He has been a divisional sales manager.

**Rodger S. Nestor Jr.** was made sales manager, stamping division, **McDowell Mfg. Co.**, Pittsburgh. He is replaced as plant superintendent by **Richard L. Schober.**

**D. Rex Scott** was made manager of planning, **Robertshaw-Fulton Controls Co.**, Richmond, Va. He was in the company's sales department with offices in Cleveland.

**Frederic G. Higbee** was made assistant manager of sales, **Trent Tube Co.**, with offices in Chicago.

**Frank R. Milliken** was appointed executive vice president of **Kennecott Copper Corp.**, New York. He was vice president-mining operations.

**Driver-Harris Co.**, Harrison, N. J., elected **K. H. Hobbie** vice president; **W. Paul Smith** and **E. J. Davies**, assistant vice presidents.

**Ernest H. Crain** was made purchasing agent, **American Cast Iron Pipe Co.**, Birmingham. **Carl J. Dreher Jr.** was named assistant purchasing agent.

**Frank R. Spratt** was made general sales manager, **Day & Night Mfg. Co.**, La Puente, Calif. He is replaced as assistant general sales manager by **Craig C. Stirewalt.**

**Arthur Sawyer** joined the products sales staff of **Hill-Chase Steel Co. of Maryland**, Baltimore.

**Raymond G. Fisher** was made vice president-marketing, a new post at **Continental Can Co.**, New York.

**John A. Backstrom** was appointed general manager, **Palmer Tool & Forging Co.**, Meadville, Pa. He was works manager of Enterprise Co., subsidiary of Wm. K. Stamets Co.

**R. E. Persohn** was made general manager of the Gadsden, Ala., Works of **Allis-Chalmers Mfg. Co.** He was assistant general manager. He succeeds **S. W. Ouweneel,** who becomes assistant to the general works manager, tractor group, in Milwaukee.

**Eric Foote** was elected vice president-manufacturing operations at **Diversey Corp.**, Chicago. He was assistant to the president.

**Leonard M. Kulze** was promoted to factory manager of **Associated Spring Corp.'s** Gibson Div. in Chicago. He is succeeded as chief engineer by **Joseph A. Harinek.**

**J. B. Gibson** was made assistant manager, tubular products, **Jones & Laughlin Steel Corp.**, Pittsburgh. **W. F. Ewart** was made administrative assistant-tubular products.

**Leonard J. Russ** was made Buffalo district manager, **Luria Bros. & Co. Inc.** He succeeds **T. G. Hanlon,** who will serve as a consultant and adviser.

**Howard W. Jeffcock** was made assistant to the president of **Morris Machine Works**, Baldwinsville, N. Y.

**Frank W. Jenks**, president of **International Harvester Co.**, Chicago, became chief executive officer upon the retirement of **John L. McCaffrey**, chairman. Mr. McCaffrey will continue to serve as a director and member of the executive committee.

## *OBITUARIES...*

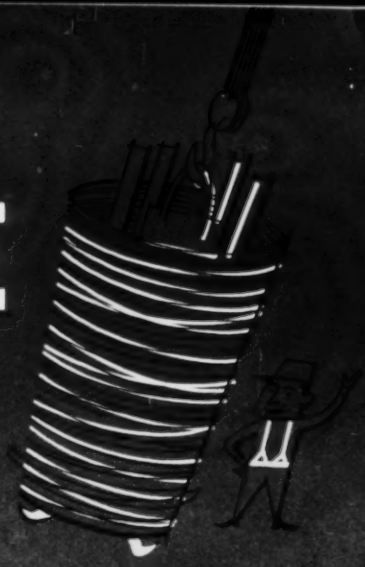
**J. Gardner Brooks**, 43, Indianapolis sales manager, **United States Steel Corp.**, died May 12.

**James D. Glenn**, 52, former vice president - general sales manager, **Crucible Steel Co. of America,** Pittsburgh, died May 8.

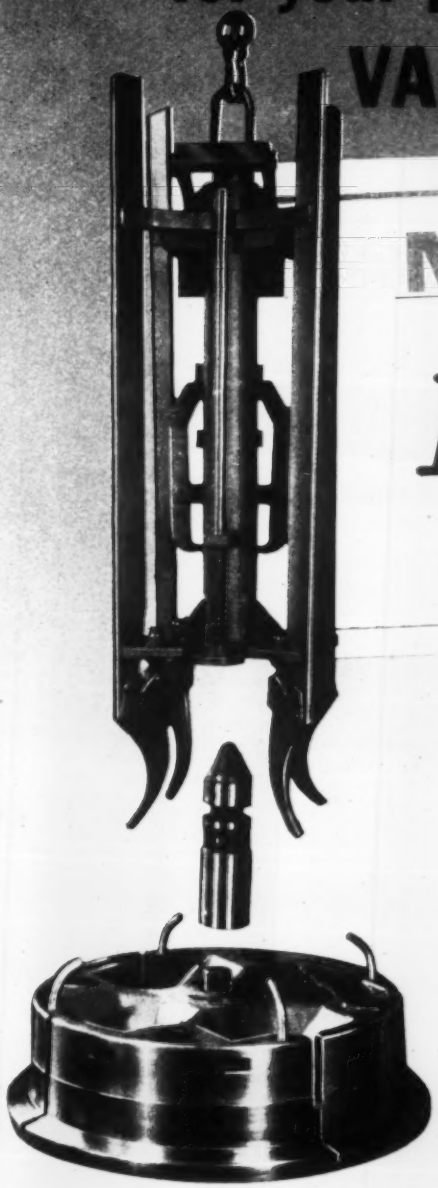
**Melvin F. Kesting**, 56, a vice president, **Wesley Steel Treating Co.**, Milwaukee, died May 5.

**Albert H. Noyes**, 79, chairman, **Hills-McCanna Co.**, Chicago, died Apr. 24.

# Want BIG BUNDLE PERFORMANCE



## for your present VAUGHN® MACHINES?



## MODERNIZE

### with the VAUGHN

# LO-BLOC®

### and COLLAPSIBLE STRIPPING SPIDER

Here is a direct, low-cost means of securing BIG BUNDLES from the Vaughn Motoblox® now on your wire mill floor—convert with the new Vaughn LO-BLOC!

The easily-installed combination of Lo-Bloc, pintle and collapsible stripping spider will permit true big-bundle production in your present operation, easy handling, better profits! • Ask us to detail the facts for you.

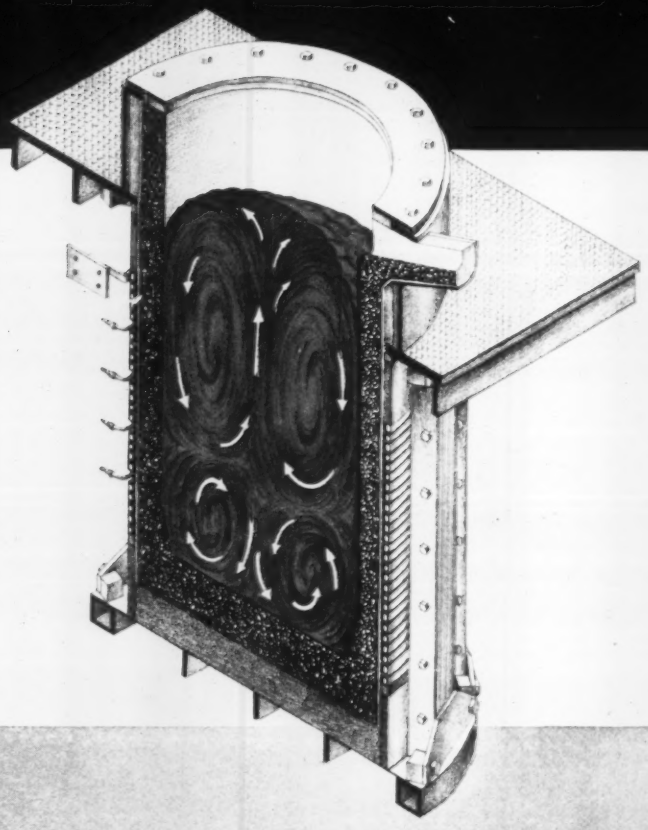

THE VAUGHN MACHINERY CO.

CUYAHOGA FALLS, OHIO, U. S. A.


**COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys**

See it at the Show*

# AJAX-JUNKER



## CORELESS 60 CYCLE INDUCTION MELTING FURNACE

*A.F.S. FOUNDRY SHOW*
*Cleveland, May 19-23*
*BOOTH NO. 1306*

IF YOU ARE UNABLE TO ATTEND THE SHOW SEND FOR BULLETIN R-58

A cylindrical induction coil supplied with ordinary 60 cycle current induces heat and vigorous electromagnetic stirring in the molten metal charge. Integrated electric controls regulate power, maintain high power factor automatically. Monolithic refractory linings are made by ramming against the sturdy water-cooled coil held in a rigid frame of magnetic and structural steel.

This new principle was perfected in Europe over the last seven years. Over 100 Junker furnaces are now in use. AJAX-JUNKER designs are based on latest experience, using American components and practices throughout.

Outstanding results are proven in these fields:

DUCTILE AND ALLOY IRON CASTINGS
RECOVERY OF IRON TURNINGS
RECOVERY OF ALUMINUM SCRAP

Available sizes range from 1 to 10 tons, with normal melting cycles from 2 to 4 hours. Power ratings are 200 kw through 1500 kw.

AJAX USA

60 CYCLE INDUCTION MELTING

## ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company

# Big Atom Smasher Planned

**Third development pilot model being built by Midwest Universities Research Association. Sharon Steel Corp. makes special steel for electromagnets to activate it**

SHARON STEEL CORP. has shipped steel to Midwest Universities Research Association, Madison, Wis., where it will be used in a pilot model of a proposed new atom smasher. The low carbon steel, virtually pure iron, is needed for 32 electromagnets required to activate the model under construction, says A. M. Tredwell Jr., president of Sharon.

A fixed field, alternating radient accelerator 1140 ft in diameter, requiring 62,500 tons of the magnetic steel for its 128 electromagnets is planned. Estimated cost: $100 million.

Because complete molecular uniformity was required for the steel slabs, Sharon exercised highest metallurgical and chemical control. A special heat of low carbon and manganese steel was supplied with controlled low quantities of phosphorus, sulfur, silicon, aluminum, copper, nickel, chromium, and molybdenum.

The proposed atom smasher will be 46 times the size of the world's present largest model (Russian) and ten times as large as a proposed new Soviet model, says Marshall Keith, manager of MURA.

## Will Enter Atomic Field

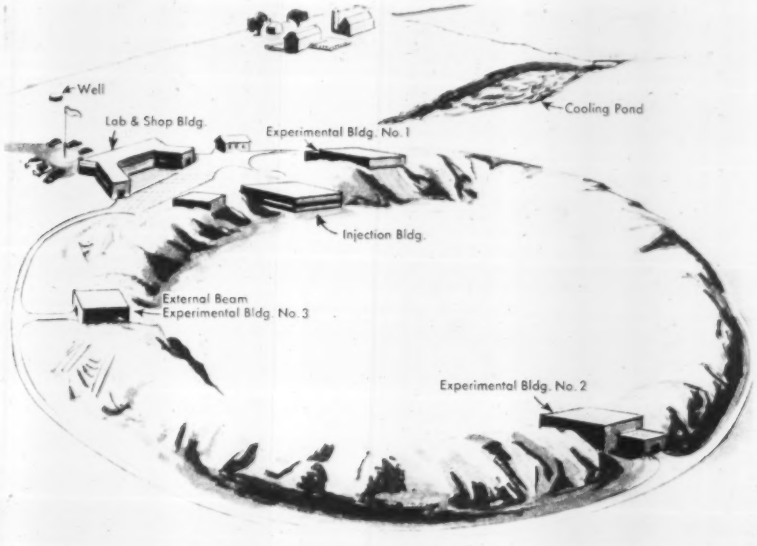
Salem-Brosius Inc., Carnegie, Pa., plans to acquire a company which is in the atomic field. Purpose: To supply structurals and weldments to firms building reactors.

## Opens Test Laboratory

A new test laboratory has been placed in operation at the Hamilton, Ohio, plant of the Hamilton Div., Baldwin - Lima - Hamilton Corp., Philadelphia. It will do research and development on the compacting of parts. Materials to be tested include metal powders, abrasives, carbides, cermets, ferrites, plastics, nuclear fuels, and solid fuels for rockets and missiles.

## New Firm Buys Quad Stove

Quad Inc., a new corporation, has purchased Quad Stove Mfg. Co., Columbus, Ohio. The company makes gas heaters and wall and fireplace inserts. Officers are: President, Myles Beeler; secretary-treasurer, E. P. Hall.




**This atom smasher will be 1140 ft in diameter and will use 62,500 tons of steel**

## New U. S. Steel Building

Consolidated Western Steel Div., U. S. Steel Corp., Los Angeles, constructed an engineering building at its Maywood plant.

## Carl J. Gross Co. Formed

Carl J. Gross and Allan Nichamin have organized the Carl J. Gross Co. Inc., metal specialists and consultants. The firm will market all grades of primary and secondary metals, alloys, scrap, and residues. Mr. Gross was formerly general manager, Midwest Dept., Federated Metals Div., American Smelting & Refining Co., with headquarters at Whiting, Ind. Mr. Nichamin was formerly national manager, Aluminum Dept., same company, with headquarters at Detroit.

## Offers Leasing Plan

Tri-State Engineering Co., Washington, Pa., has introduced a pay-as-you-go leasing plan for heavy duty material handling equipment. The equipment can be rented for three or five years, with an option to buy at the end of the rental period. Boothe Leasing Corp., San Francisco, will be lessor for all equipment.

## Detroit Foundry Renamed

Detroit Gray Iron Foundry Co., Detroit, changed its name to Detroit Gray Iron & Steel Foundries Inc.

## Buys Graphite Plant

Josef S. Milner purchased the Benjamin Franklin Graphite Co. plant and mine at Chester Springs, Pa., from the General Services Administration. Price: $101,000. It is equipped for the mining and milling of 5 to 8 tons of graphite a day. Graphite Corp. of America has been formed to run the property. Officers are: J. S. Milner, president; Stan Milner, vice president; Barry Hersh, secretary-treasurer. The company plans to spend

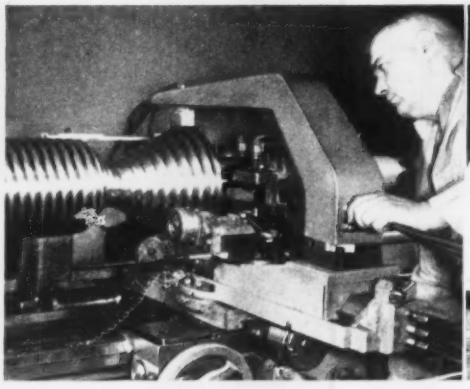
(*Please turn to Page* 117)

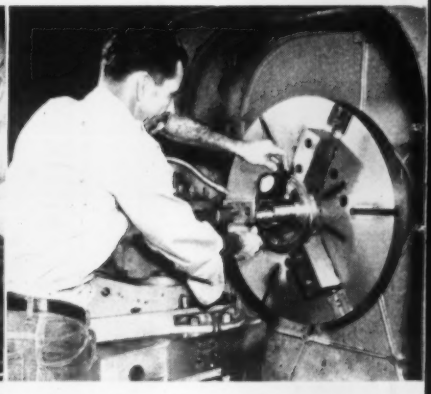
# till they

## RIGHT ON THE NOSE— AND EVERYWHERE!

Grinding complex missile shapes, in many cases, would be either costly, difficult, impossible or all three. Monarch Air-Gage Tracer users produce finishes of 17-18 micro-inches **regularly**—some of which are polished to 2-3 micro inches. Good enough—and no grinding problem! (Above—unretouched photo of die mold for plastic nose cone turned to a 16-18 micro-inch finish)

**Monarch**
**TURNING MACHINES**
ACCURACY • ECONOMY • LONG LIFE
FOR A GOOD TURN FASTER ... TURN TO MONARCH





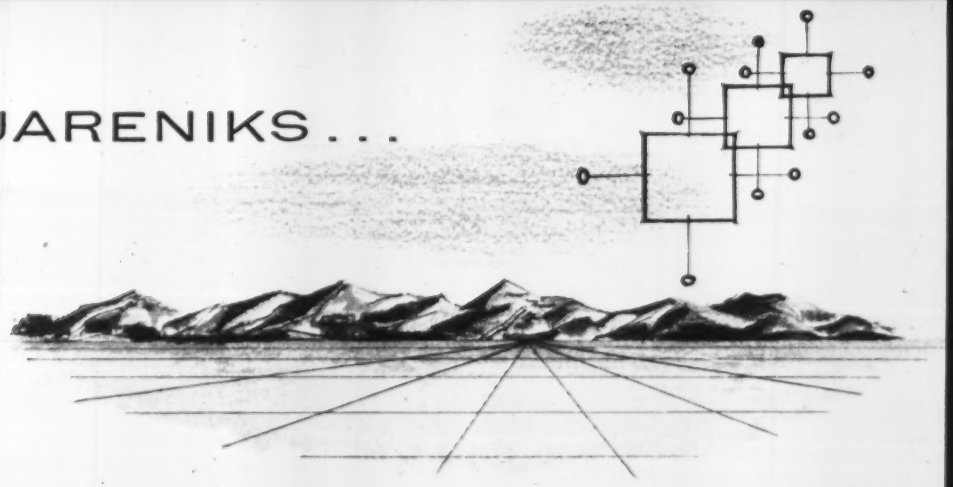
## WHAT IT TAKES:

Air-Gage Tracer Control, Swiveling Action—a Monarch exclusive. Only with this equipment can you generate—in a single machining set up—the exacting, complex, often exceedingly thin-walled contours demanded by missile hardware. Tracer-controlled single point turning is mandatory for accuracy needed for critical parallelism, squareness and concentricity—and cheaper, too! (above a helix combustion chamber)

## GREAT ON THE FACE OF IT

Numerous Monarch lathes afford you the advantages of constant surface cutting speed—so important to speed and finish in the facing of large, thin-walled work. Shown is a facing operation on a ram-jet turbine disc. Machine is a Monarch Model F Right Angle Lathe, swinging 60" in gap, equipped with Air-Gage Tracer Controls and constant surface cutting speed operating on both sides of center.

want SQUARENIKS . . .



# THE MONARCH SWIVELING AIR-GAGE TRACER

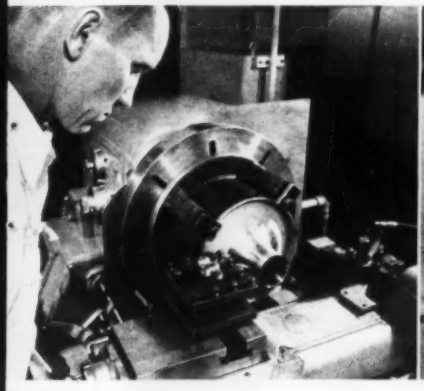
## is a missile and rocket making "must"

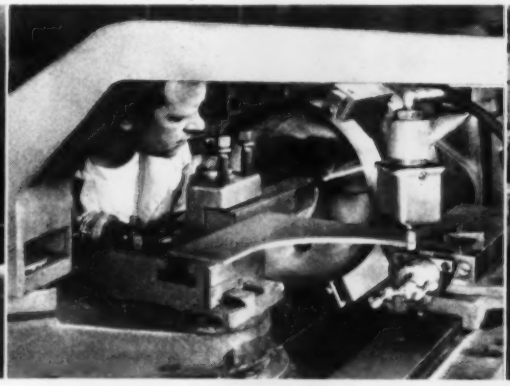
"Many jobs can be performed satisfactorily only on Monarch swiveling Air-Gage Tracer lathes," says one of the country's leading experts in the field.

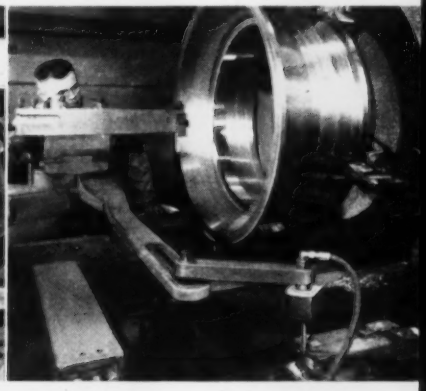
Today, missile manufacturing is in its infancy. Even so, Monarch tracer lathes have proved themselves wherever used. And that is in most plants where missile components are being produced. Both swiveling and rigid types are employed. Adaptable to such work are all sizes from the small 10" Model EE to the largest Heavy Duty Lathes, plus the Mona-Matics and the Right Angle Lathe.

Profit by the experience of others. Check the applications pictured and described below. Then ask us for the whole story. Finally, remember we are talking about the same Air-Gage Tracer that is improving production and lowering costs in thousands of plants throughout metal working.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO







### SELF-GAGING TURNING!

This rocket propellant chamber component is simple compared to some shapes. How's to gage them? Even expensive gaging fixtures can't always fill the bill. So what? With the close repetitive accuracy of Monarch Air-Gage Tracing, intricate parts are accepted based on the accuracy of the flat template used. Light (6-8 oz.) stylus pressure precludes template wear.

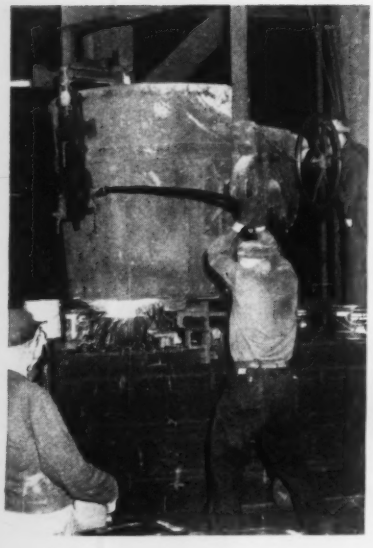
### MULTI-THOUSAND DOLLAR QUESTIONS—AND EVERY ANSWER RIGHT!

What's to do when you spoil pieces in this business? Especially ones that might cost up in the thousands before machining (Not shown, but we've seen 'em!) Cut your throat? No—rely on the .0001" constant repetitive accuracy of your Air-Gage Tracer slide movement—**and don't spoil any!**

### IT DON'T MEAN A THING IF IT AIN'T GOT THAT SWING

You need size in this business now—and they're designing bigger all the time. That extra-large work can be Air-Gage Traced overall on a Monarch. The turbine housing above is a typical example. But we're not stopping here. **If present Monarch sizes don't meet your actual anticipated needs, let us talk over greater swing designs with you.**

# 4-TON ESCO PUMP CASTINGS ON WORLD'S LARGEST "CANNED" PUMPS



**. . . RESIST WATER CORROSION AT HIGH PRESSURES AND TEMPERATURES**

Four mammoth Westinghouse "canned" motor pumps with *ESCO* volutes have been installed recently in the nation's first full-scale atomic electric generating plant at Shippingsport, Pennsylvania. These 1250 h.p. giants can pump 18,300 gallons of radioactive water coolant per minute at approximately 2000 psi at up to 500 degrees F.

The pump housings or "volutes" were cast by *ESCO* in Alloy 40-S (ACI-CF8), to withstand the severe corrosive effects of water at high temperatures and pressures. Castings were radiographed to ASTM specification E71, Class II and 100% dye-penetrant inspected.

Casting specifications and inspection requirements for nuclear application are thoroughly understood at *ESCO*. Equipped with the finest facilities and the technical know-how, *ESCO* welcomes the toughest casting assignments. Ask your nearest *ESCO* representative for details or write direct.

ESCO®

**ELECTRIC STEEL FOUNDRY COMPANY**

2160 N. W. 25TH AVE. • PORTLAND 10, OREGON

MFG. PLANTS AT PORTLAND, ORE. AND DANVILLE, ILL.
Offices in Most Principal Cities

MFG. PLANTS AT PORTLAND, ORE. AND DANVILLE, ILL.
Offices in Most Principal Cities

ESCO INTERNATIONAL, NEW YORK, N. Y.
IN CANADA ESCO LIMITED

(*Concluded from Page 113*)

up to $50,000 on machinery to improve the quality of product.

## Foundry Buys Equipment

American Steel Foundries has installed $250,000 worth of heat treating facilities in its East Chicago, Ind., Works. They will be used in producing alloy steel castings.

## Opens Research Center

Rome Cable Corp. is moving staff members and equipment into its new research center at Rome, N. Y. The center, representing $750,000 in building and equipment, will be in full operation in July or August.

## Will Build in New Orleans

Westinghouse Electric Corp., Pittsburgh, plans to build a product distribution center in New Orleans. It will consolidate the firm's sales offices in the area. Westinghouse Electric Supply Co. will continue to maintain separate headquarters and facilities.

## Duquesne To Get Furnace

An electric-arc furnace is being built at the Ambridge, Pa., plant of U. S. Steel Corp.'s American Bridge Div. for installation at the corporation's Duquesne (Pa.) Works. It will have a hearth 20 ft in diameter and a rated capacity of 83 tons per heat—increasing the Duquesne Works's electric furnace steelmaking capacity by 75,000 tons a year. The electric furnace shop is being expanded.

## Cooper Alloy Expands

Cooper Alloy Corp., Hillside, N. J., has embarked upon a two-year expansion and modernization program. The first phase, scheduled for completion this year, includes additional manufacturing areas, equipment, and new material handling systems for the foundry, machine shop, pump, and warehouse departments. Several pieces of automatic equipment have been purchased for the Stainless Engineering & Machine Works Div. for the manufacture of stainless valves and fittings. A cobalt 60 gamma

Yes, that's a strong promise. But it's being done right now in plants like yours. Here's how:

**Match the requirement of your job with a custom-built Reading crane at no extra cost**

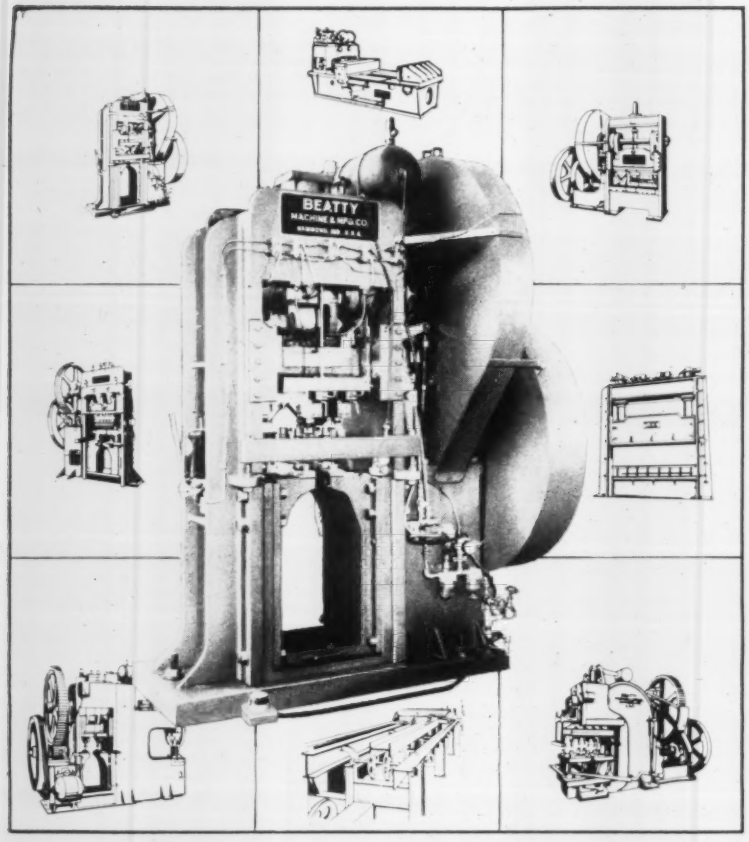
Imagine, at what you'd normally pay for an "ordinary" crane, you can actually have one "tailor-made" for your own plant. For when you order a READING CRANE, our engineers offer you a choice of several interchangeable motor, trolley and hoisting units.

Known as UNIT CRANE DESIGN, this unique construction method assures greater operating efficiency. It enables you to move more materials at the lowest possible cost. And it helps you reduce maintenance time and save maintenance dollars—any unit can be removed for overhauling or repair without dismantling any other unit!

READING CRANE & HOIST CORPORATION 2102 Adams St., Reading, Pa.

**READING CRANES**

CHAIN HOISTS · OVERHEAD TRAVELING CRANES · ELECTRIC HOISTS




# IN ONLY 2 PASSES INSTEAD OF 4 . . .

This new No. 7 Detail Flange Punch accomplishes the flange punching of I-beams in only two passes, where ordinary equipment requires four passes. There's production speed that pays off every hour of operation. Especially designed to speed single-hole flange punching in small structural steel fabricating shops, this compact punch incorporates entirely new design that eliminates the end-for-end turning of beams — requires less floor space than open-throat installations.

The punch has 100-ton capacity, mechanically driven guillotine-type. It will punch up to 1¼" diameter hole through 1" mild steel and handles beams with 6" to 36" webs. Opening through frame is 26"; length of stroke — 2"; distance ram to table, stroke up — 12".

**WRITE FOR FULL DETAILS**

Get full information on this compact, high production flange punch . . . or on the complete line of Beatty heavy metal-working equipment.

**BEATTY MACHINE & MFG. CO.**
966 150th St. Hammond, Indiana


ray unit has been ordered for the Nuclear Products Div. to check the quality of large reactor valves and fittings. Cost of the first phase: $500,000.

## ASSOCIATIONS

F. H. LOVEJOY
*ASWA president*

Elected at the 49th annual convention of the **American Steel Warehouse Association** in Las Vegas, Nev., May 11-14 are: President, F. H. Lovejoy, Wheelock, Lovejoy & Co. Inc., Cambridge, Mass.; chairman, executive committee, C. L. Hardy, Joseph T. Ryerson & Son Inc., Chicago; treasurer, Paul O. Grammer, Grammer, Dempsey & Hudson Inc., Newark, N. J. Robert G. Welch was re-elected executive vice president and secretary; John E. Doxsey, assistant secretary, with offices in Cleveland.

New officers of the **National Screw Machine Products Association,** Cleveland, are: President, C. J. Baumgart, Screw Machine Engineering Co., Chicago; vice president, L. R. Schaffer, Mechanical Art Works Inc., Newark, N. J.; treasurer, R. G. Herker, Herker Screw Products Inc., Milwaukee. Orrin B. Werntz was re-elected counsel and executive vice president; Margaret S. Ballinger, secretary.

**Air-Conditioning & Refrigeration Institute,** Washington, elected these officers: President, D. V. Petrone, Typhoon Air Conditioning Co., a division of Hupp Corp., Brooklyn,

*Announcing*

# NEW SOURCE

for

stainless

steel

wire

## J & L Stainless Steel Division's New Wire Mill Offers Wide Range of Wire Sizes

The increasing use of stainless steel wire in new product development, old product improvement and for experimental purposes has placed a new responsibility on the manufacturer of quality stainless steel.

To meet this growing need, J & L Stainless Steel Division is pleased to announce the opening of its new wire mill . . . to make available stainless wire in a wide range of sizes, finishes and coatings.

For data regarding wire, its properties and uses, consult our Stainless Steel Wire Manual. For special applications write in detail giving complete information about your requirements.

Wire now for your copy of J & L's new Stainless Steel Wire Manual.

Improve your Products with . . .

J&L STEEL STAINLESS

BAR • WIRE • SHEET • STRIP

**Jones & Laughlin Steel Corporation** • STAINLESS STEEL DIVISION • Box 4606, Detroit 34

# Of course you can titrate NIALK® TRICHLOR but you never have to

**psp is why** • The reason you take the time and the trouble to titrate your degreasing solvent is to make sure its stabilizer is still active.

Users of Nialk trichlorethylene find six good reasons why they never *have to* titrate. All six add up to *psp*—permanent staying power.

**psp means neutral** The neutral Nialk stabilizer cannot react with acids to form corrosive salts. Yet it will "accept" acids and render them neutral and harmless.

**psp means insoluble in water** You never lose the Nialk stabilizer during steam distillation or in the water separator of your degreaser.

**psp means full protection** The Nialk stabilizer has the same boiling point as the solvent, so you get complete recovery during distillation and full protection in your degreaser's vapor phase.

**psp means no staining or discoloration of parts** There are never compounds present which can cause staining or deposit formation on the metals you degrease.

**psp means clean bath and coils** Nialk trichlor eliminates those deposits on coils which cut down heat transfer. Nialk baths have gone for long periods of time without coil cleaning.

**psp works with all metals** Even white metals are degreased safely with Nialk. Chlorides of these metals, which might be formed under unusually severe conditions, are rendered harmless by the Nialk stabilizer.

Hooker Bulletin 70 gives a complete study of stabilizers. Bulletin 72 offers a standard titration method for Nialk trichlorethylene. Send the coupon for either.

Please send: ☐ Bulletin 70, Advantages of Nialk Neutrally Stabilized Trichlorethylene ☐ Bulletin 72, Acid Acceptance Test for Trichlorethylene.

Name .....

Title .....

Company .....

Street .....

City ..... Zone ..... State .....

**HOOKER ELECTROCHEMICAL COMPANY**

1205 UNION STREET, NIAGARA FALLS, N. Y.

HOOKER CHEMICALS PLASTICS

*Sales Offices:* Chicago · Los Angeles · New York · Niagara Falls · Philadelphia · Tacoma · Worcester, Mass.
*In Canada:* Hooker Chemicals Limited, North Vancouver, B. C.

If you have to titrate your degreasing solvent often because it contains stabilizers which wear out, it's time you took a look at Nialk TRICHLORethylene with *psp*.

N. Y.; vice president, Rudy Berg, Copeland Refrigeration Corp., Sidney, Ohio; and treasurer, L. N. Hunter, National-U. S. Radiator Corp., Johnstown, Pa.

## NEW ADDRESSES

**Detroit Steel Corp.**, Detroit, moved its Dayton district sales office to 2801 Far Hills Ave., Oakwood (Dayton 19), Ohio. Robert O. Trimmer is district manager of sales.

**Chicago Bridge & Iron Co.**, Chicago, moved its Houston erection district facilities to new quarters on an 85-acre site northeast of Houston.

**Ward Leonard Electric Co.**, Mt. Vernon, N. Y., moved its district office to 929 Park Ave., Pittsburgh 34, Pa. Leonard H. Wurzel is district manager.

## NEW OFFICES

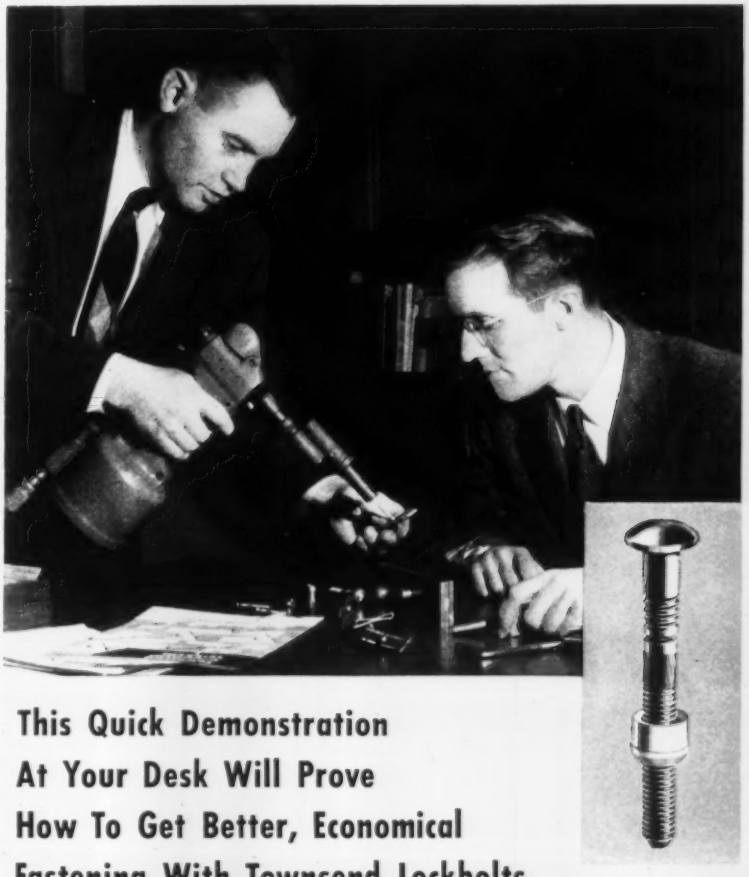
**Michigan Tool Co.**, Detroit, opened sales offices at these locations: 7702 W. North Ave., Elmwood Park (Chicago), Ill.; 6101 College Ave. Bldg., Indianapolis; 1413 S. 86th St., West Allis, Wis.; and Fifth Ave. Bldg., Moline, Ill.

**S. L. Cooper Co.**, Washington, distributor of Yale & Towne Mfg. Co. material handling equipment, opened a sales office at 3204 Williamson Rd., Roanoke, Va.

## NEW PLANTS

**Westinghouse Electric Supply Co.**, Pittsburgh, will build a warehouse-office building at 330 S. First Ave., Duluth. It will serve as a sales office and warehouse for WESCO and as a sales office for Westinghouse Electric Corp.'s Apparatus Sales Div.

**Producto Machine Co.**, Bridgeport, Conn., opened its assembly plant at 45 Kenneth St., Newton Highlands, Boston 61, Mass. Products include die sets, diemakers' accessories, and toolroom equipment.

**This Quick Demonstration At Your Desk Will Prove How To Get Better, Economical Fastening With Townsend Lockbolts**

A few minutes of your time invested in watching a simple demonstration of a better fastening method may point the way to savings of thousands of dollars in assembly of your products. The Townsend lockbolt provides a quick method of producing tight, rigid fastenings that cannot loosen even under extreme vibration or shock conditions.

We would like to have a Townsend engineer demonstrate to you and others in your organization how these lockbolts combine the advantages of riveting and bolting—eliminate the disadvantages. He will show you that installation is fast—that fewer workers can complete an assembly in less time—you improve your product—achieve a lower installed cost.

You will be able to see why the clamping action, or clinch, of Townsend lockbolts is higher than rivets—is more uniform than bolts and nuts. The demonstration will explain how the lockbolt fills the hole better than other fasteners—makes possible a more rigid joint and provides an effective liquid seal.

Townsend lockbolts are available in steel and aluminum alloy, in $\frac{3}{16}$", $\frac{1}{4}$", $\frac{5}{16}$" and $\frac{3}{8}$" diameters, in grip length ranging up to 2", in various head styles.

For a demonstration on how to speed production, get tight, secure, permanent fastening with Townsend lockbolts write on your company letterhead to Townsend Company, P.O. Box 237-C, New Brighton, Pa.

Licensed under Huck patent nos. RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; 2,754,703

THE FASTENING AUTHORITY

**Townsend**

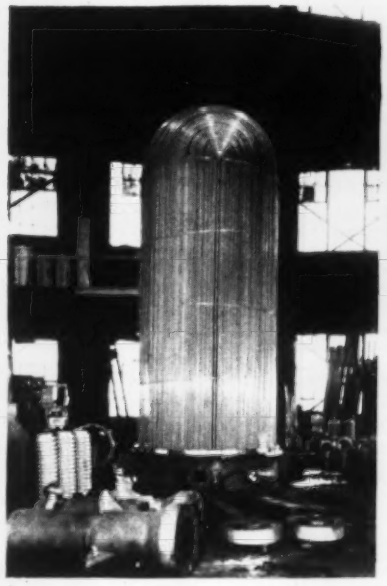
COMPANY • ESTABLISHED 1816

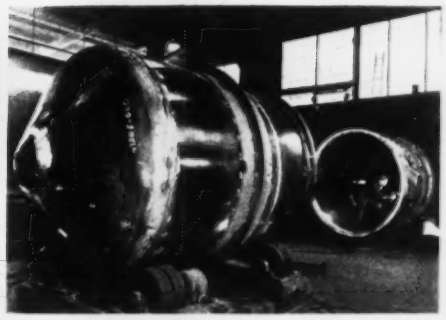
NEW BRIGHTON, PENNSYLVANIA

Sales Offices in Principal Cities

Cherry Rivet Division • Santa Ana, California

*Again*-ADSCO *mammoth heat*





▲ GRINDING DOWN ONE OF THE WELDS made in the vapor condenser shell of Revere Herculoy. Completed unit measured 90" x 26' with a total weight of 100,000 lbs. Units were fabricated by ADSCO DIVISION, YUBA CONSOLIDATED INDUSTRIES, INC., Buffalo, N. Y.

◀ TUBE BUNDLE of 2,150 Revere Copper Tubes, each ¾" in diameter, rolled into 4,300 Tube Sheet holes, with a total weight of 26 tons and producing a surface of 14,000 sq. ft. To prevent damage during shipment wax was poured around the unsupported rounded ends of the tube bundle, which, when hardened, held the ends firmly in place. After the exchanger was placed into position the wax was blown out with steam.

# *exchangers contain* REVERE METALS

**105,000 lbs. of Revere Copper Tube and 50,000 lbs. of Revere Herculoy Plates are used in two 50-ton units fabricated for National Aniline Division, Allied Chemical & Dye Corp., by Adsco Division, Yuba Consolidated Industries, Inc.**

These two units are duplicates of the two constructed for National Aniline Division, Allied Chemical & Dye Corp. in 1953.

In addition to their huge size and weight it is interesting to note that the tube bundle was constructed of copper tube because of its high thermal conductivity and corrosive-resisting characteristics, and the shell made of Herculoy because of the accuracy and speed with which it can be welded, its great strength and corrosion-resistant features.

Herculoy is Revere's silicon bronze with the tensile strength of mild steel and corrosion-resistant qualities of copper, and is a natural for shells such as these. Its characteristics also make it the economical answer for tube sheets and plates.

It is jobs such as this that have given Revere the background of experience that can prove valuable in the solution of your particular metals problem. And is still another example of Revere's Technical Advisory Service helping to select the right metal, in the right form, to do the best possible job with the greatest economy . . . whether it be copper, brass, aluminum, or any one of their alloys.

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230 Park Avenue, New York 17, N. Y.

*Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.*

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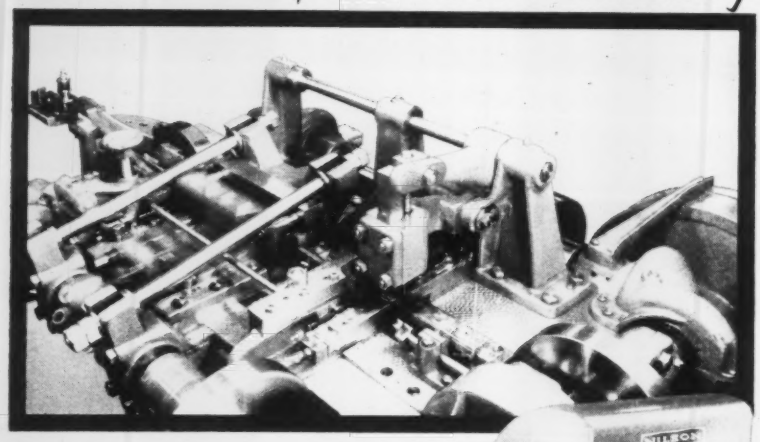

# WHY

Cost-Conscious Companies

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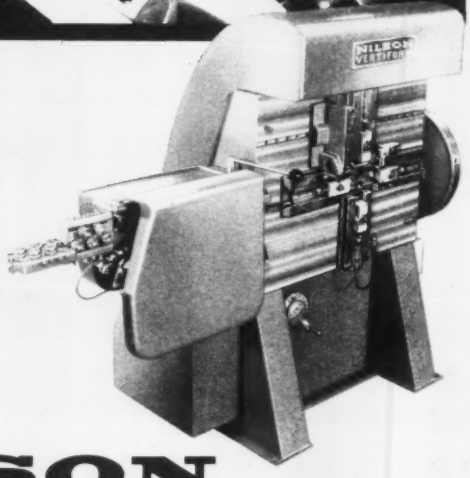

Every Nilson 4-Slide Forming Machine is designed with built-in flexibility! Most models handle either wire or ribbon metal with equal speed and accuracy . . . can combine stamping, welding and other secondary operations with the basic forming cycle. Easy access to tooling insures rapid setups, minimum down-time for job changeovers.

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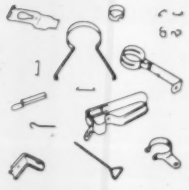
**Illustrated at top is Model S-1-F Machine, showing built-in press and open construction of forming area. Directly above is the new Vertiform Machine.**



SIZE RANGES:
Wire up to ½" diameter
Ribbon stock to 3½" wide
Feeds up to 32"
5 TO 75 TON
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AUTOMATIC WIRE & RIBBON METAL FORMING 4-SLIDE MACHINES • WIRE & STOCK REELS • WIRE STRAIGHTENING EQUIPMENT • AUTOMATIC STAPLE FORMING MACHINES • SPECIAL WIRE FORMING EQUIPMENT

*Coming June 16*

# Pricing for Profit

How do you set prices? How do you determine the price at which the prospect will buy and at which you can make a fair profit? Who should make the pricing decision? How should price increases be announced, and when? How do you avoid price wars?

Those and other questions, which are unusually important in a recession year, will be answered in STEEL's next Program for Management article.

●

Published so far in the 1958 series:

1. **Balancing Management for Profit (Feb. 17, p. 113)**
2. **Production Control for Profits (Mar. 17, p. 83)**
3. **Managing Defensework for Profit (Apr. 14, p. 125)**
4. **Building a Labor Contract (May 19, p. 125)**

Extra personal copies of these Program for Management articles are available until the supply is exhausted. Write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

●

# Building a Labor Contract

BUILDING a labor contract is like building a home. First you have to construct it; then you have to live in it to find flaws; finally, you make changes for more comfortable living.

Too often, additions to labor contracts, like additions to houses, are just tacked on. The result is an unlivable, sprawling structure.

**Sleepers**—The analogy applies especially to noneconomic issues such as discipline, seniority, and work standards. By the time the company and union have settled wages and fringes, negotiators are often weary or pushing a deadline; they let indirect provisions slide by. The consequences can be as costly as excessive wage scales. Ill-advised action, or nonaction, can lead to time-consuming grievances that reap their toll in slower production, or ill feeling, or even wildcat strikes.

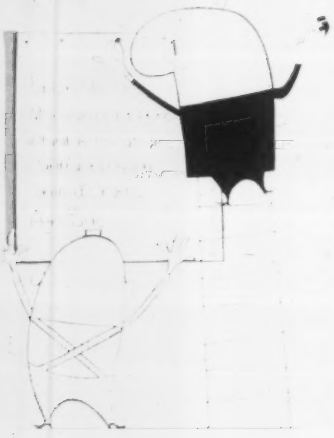
The American Arbitration Association's study of 980 labor cases shows that 456 involved discipline and discharge; 301 were over seniority questions; and 223 concerned job evaluation (stemming from production standards). The union won 53.6 per cent of the discharge issues and 45 per cent of the cases on seniority, job evaluations, and incentives. Most of the cases could have been avoided if management had paid more attention to noneconomic issues.

**Time Is Now**—Between 75,000 and 90,000 of the 125,000 labor contracts in existence expire this year, says the Bureau of Labor Statistics. Chances are yours is on the list. Now's the time to build a better contract and make it work in the economic and noneconomic areas. Methods and ideas advanced in this article work equally well for both. Special attention is given to discipline, seniority, and work standards because they're so troublesome.

## Prepare To Build

The military maxim, get there fustest with the mostest, applies to negotiating labor contracts. The more ammunition you have, the better your chances of getting what you want.

**Right To Manage**—"If management wants to preserve the right to manage, it must take the initiative, instead of waiting for the



## Better Build in These Areas

**The Federal Mediation & Conciliation Service, Washington, thinks that six big problems will continue to be sources of trouble:**

1. **UNION SECURITY—**
   - a. Agency shop.
   - b. Right-to-work laws.
   - c. Unemployment.
   - d. Jurisdictional disputes.
2. **MANAGEMENT PREROGATIVES—**
   - a. Featherbedding.
   - b. Subcontracting.
   - c. Work standards.
3. **PLANT RELOCATIONS—**
   - a. Company-wide seniority.
   - b. Severance pay in plant transfers.
   - c. Rights to union representation in new plants.
4. **CONTRACT LENGTH—**
   - a. Cost-of-living escalation.
   - b. Annual improvement factors.
5. **SKILLED CRAFTS—**
   - a. Wage differentials.
   - b. Separate representation, bargaining, and ratification rights.
6. **PENSIONS—**
   - a. Right to bargain cost of living for retired pensioners.
   - b. Vesting.
     - (1) Withdrawal of funds on quitting.
     - (2) Transfer of funds when changing jobs.

union to make demands," declares Bob McCoy, industrial relations manager of Calumet & Hecla Inc.'s Wolverine Tube Div. plant at Detroit.

It means making demands of your own—something few firms want to do today. To make demands, and to bargain successfully, you'll need facts to support your claims. The list above shows what kind of information is useful and where to find it.

**Collect Data**—Start with your own management. Owen Fairweather of Seyfarth, Shaw, Fairweather & Geraldson, Chicago, suggests: Take a cost accountant off his regular job several months before your contract expires; have him develop statistics on such things as work standards and hidden seniority costs, as well as figures to support your economic position. He's a good man to have on the bargaining team—at least use him as an adviser.

Grievance files also reveal sources of trouble. Muskegon Piston Ring Co., Muskegon, Mich., files each grievance by subject as it's processed. In preparing for negotiations, it looks at the fattest files first.

**Foremen Are Key**—Most companies realize that front line supervisors have keen insight into what contract changes are needed. Like many firms, Wolverine Tube calls in its foremen 30 to 60 days before a contract expires. It asks them what provisions have caused trouble and what changes will be helpful.

Although a majority of the firms STEEL talked with think foremen can do this in writing, Mr. Fairweather prefers a conference. "Many times," he says, "a foreman will propose a change that would be harmful to another department. When the foremen are together, they can see why a change should or shouldn't be made. This avoids hard feelings among the foremen when you make your final decision."

**Stand in Line**—Know bargaining patterns in your area. If you get too far above the line, you'll lose friends in other companies. If you drop below, you may be on the way to downgrading your work force.

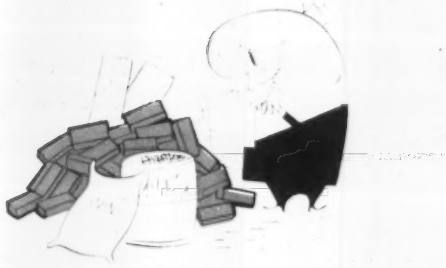
G. B. Strong, assistant manager of employee relations, American Brake Shoe Co., Chicago, cites a contract that was beneficial to a company but lower than the area average. Result: Topnotch workers drifted away. "The firm was left with labor culls," says Mr. Strong.

**Watch Patterns**—It's also wise to consider the pattern of agreements in your industry, as well as what big company patternmakers do. Warns Ken Porter of the Employers Association of Detroit: "Don't just take the pattern per se. What works for General Motors, or for your competitor in another state, will never quite fit your situation. Bargaining patterns must be adapted to work sucessfully."

### Know Your Union

Experts don't think you should go out of your way to butter up union men.

Says Mr. McCoy: "You and the union have a business agreement. Deal with each other on a business



## Getting Ready To Build

### Find the Facts You Need

1. **FROM YOUR OWN COMPANY—**
   Financial statements will show your break-even point and indicate whether you can absorb a wage increase. Foremen and supervisors can tip you off to problems they've had with the present contract and suggest changes for the next one. Grievance files will point out trouble areas. Become familiar with production costs, methods, and productivity rates.

2. **FROM EMPLOYER ASSOCIATIONS—**
   These groups can tell you what wage rates and fringe benefits are in effect in your area. They compile information on local economic and employment conditions that can affect your bargaining. Some will negotiate for you. In larger cities, the Chamber of Commerce often offers a similar service.

3. **FROM TRADE ASSOCIATIONS—**
   Management and trade associations have information on your industry's contract patterns, wage rates, and economic conditions. Some offer negotiation services or will check your contract for danger areas.

4. **FROM UNION PUBLICATIONS—**
   They can give you insight into union demands and how they are being received by management. You can get a tip-off on how your local stands with its national union.

5. **FROM FEDERAL GOVERNMENT—**
   The Bureau of Labor Statistics collects wage, employment, and production data for your industry, your area, and your products. The Federal Mediation & Conciliation Service stands ready with information on grievance settlements and arbitration awards that can help you locate trouble areas in your present contract and show you how others do it.

6. **FROM CONSULTANTS—**
   If you're unfamiliar with negotiating a contract, a good industrial relations firm can be helpful. Most of them prefer to advise. You still do the bargaining. Their viewpoint is often more objective than yours. One caution: Make sure you pick a reputable firm.

### Use the Facts You Find—

1. To determine what you want now and in the future.
2. To determine what the union wants.
3. To decide what you can afford to give.
4. To prime your bargaining team so it can negotiate from facts.

basis. To do this, you need only to have mutual respect."

**What Will They Do?**—But you must know the union's philosophy, its aims, and how it's going to react to your proposals. It's also helpful to know how the union's bargaining team operates.

Prof. William Haber, University of Michigan economist and labor arbitrator, thinks the union's international representative is a key man to watch. He's more objective than the others. Professor Haber cites the case of a small Michigan metalworking firm whose union bargaining team showed the international man five demands it sought. Advised the rep: "Don't ask for number three. The company's so scared of you, it'll probably give in. It would break them. You'd all be out of jobs."

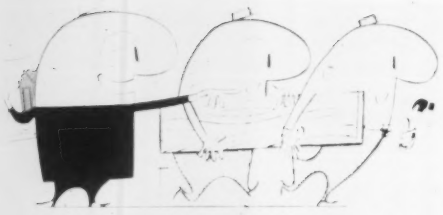
### Build a Bargaining Team

After you have compiled your information, know how far you can go, and what you want in your contract, it's time to pass the information to your bargaining team. They will already have most of it, but final briefings will give them confidence.

The team should be small, but diversified, and made up of men the union knows and respects. Most industrial relations men feel it's unwise to include the company president unless bargaining is his specialty—generally, it isn't. But it's always wise to use him as an adviser outside the bargaining room to spot loopholes in your strategy.

**Act It Out**—Role playing is a favorite method of preparing the team. It sets up several possible contracts (tough, intermediate, and weak) and chooses sides. One group "plays" the union, the other, management.

Regular bargaining procedure is followed. Such sessions help the team get the feel of how the union



## Making the Contract Work

### Through Foremen

1. Explain the contract to them as soon as it's signed.
2. Give them refresher courses on contract provisions.
3. Give them examples of good and bad handling techniques.
4. Let them talk over problems among themselves.
5. Never bypass them.

### Through Grievance System

1. Keep grievance machinery simple.
2. Specify the time allowed to file at each grievance stage.
3. Process grievances only through management's chain of command.
4. Keep a written record of all grievances and results.
5. Always tell your foremen how a grievance came out if he doesn't know.

### Through Arbitration

1. Specify in the contract how arbitrators are to be chosen.
2. Get the union to agree on sharing arbitration costs.
3. Limit the time an arbitrator has for making decisions.
4. Allow arbitration only on interpretations or violations of the contract.
5. Don't let an arbitrator's decision make you rewrite your contract.

will approach negotiations, give it a chance to become better acquainted with contract demands, aid in setting up counterproposals, and bring weak points to light.

The American Management Association says more firms, particularly smaller ones, are beginning to put a topnotch foreman on the bargaining team. He understands the union, and it brings him closer to the management team.

**Summary**—When your bargaining team is primed with information about your company, your industry, your area, and your union, it's easier to make demands of the union. The positive approach pays off, says AMA in its new book, *Understanding Collective Bargaining*.

But confine your proposals to one or two items that will be worth something in years to come. Noneconomic issues are naturals. If you get proposal happy, the union is liable to oppose anything you suggest.

A final warning: Set a timetable for your preparations. Start early. Be ready.

### Make the Contract Work

The real job starts after you get your contract. You have to make it work. Your success will depend primarily on how well you explain the contract to employees and how well you handle problems that grow out of it.

Eliminating the hocus-pocus often associated with the "art of negotiations" is the first step to understanding the agreement and making it work. Many firms are following Timken Roller Bearing Co.'s plan. The Canton, Ohio, company sends daily bulletins to all hourly and salaried employees at their homes. They're timed to arrive before the news gets into daily papers.

### . . . Through Foremen

Since your line supervisors are the men who will have to administer the agreement, it's vital that they know what changes were made and what was discussed, but not settled, and why. They should get the information promptly.

**One Plan**—Reliance Electric & Engineering Co., Cleveland, holds foremen-steward meetings for each of its divisions as soon as the contract is ratified. A panel made up of management and labor representatives (including members of the bargaining team) sits in.

Each side presents and explains contract clauses. The panel is referred to for confirmation. Questions from the floor are discussed.

Edward Loomis, Reliance's personnel director, says: "We find this is one of the best ways of taking the heat off negotiations after they're over. It leads to a climate of mutual understanding."

**Refreshers** — Several meetings with foremen are necessary. Some companies hold refresher courses during the year. Industrial relations men give foremen examples of right and wrong handling techniques, ask for solutions to hypothetical and actual problems, and give brief quizzes on contract provisions.

### . . . Through Grievances

No matter how good your supervisors are, they won't always agree on what contract clauses mean. Disagreement makes for grievances. Handling them is a second important step in making your contract work.

J. W. Vanden Bosch, labor relations adviser for Cleveland's Chamber of Commerce, points out the two philosophies that govern grievances. He says: "One side believes that writing it down stiffens backs on both sides and makes set-

## Clauses That Cause Trouble

tlement difficult. The other side believes writing out grievances makes you think about what you're doing—and cuts down on filing grievances."

Regardless of your theory, make sure your contract defines a grievance. Otherwise, the union can file on any difference of opinion.

How strongly you believe that management rights are everything not expressly granted in the contract will govern how strictly your definition is worded. A tight definition says a grievance is a misunderstanding, interpretation, or violation of contract terms.

**Seek Simplicity**—The next step is to set out simple rules for processing grievances. Larger companies usually use a four-stage process, but *Successful Labor Relations for Small Business*, a book by James Black and George Piccoli, maintains that three are practical for small shops:

1. The foreman and employee discuss the grievance. The nature of the complaint and its settlement are recorded. Failure to reach agreement is also put on record, along with the foreman's comments on the matter.

2. Employee, union official, and foreman meet to adjust the complaint. The settlement, or reason why there wasn't one, is made a matter of record.

3. Employee, union official, and plant owner (or superintendent) review the problem and seek to adjust it. A written record is kept, and the final decision is noted. A case that isn't settled normally goes to an arbitrator.

**Time Limits**—The union likes to save up grievances for "political" occasions, so limit the time a man has to file a grievance and the steward has to process it from one step to the next.

**Let Them Know**—Tell workers and foremen how grievances are resolved—it's particularly important for a foreman if the grievance is a company policy type that goes over his head. Too often, he doesn't know what happened until the shop steward tells him. Set up a chain of command and use it.

Reliance Electric is one of the few companies that give shopworkers settlement results. The information is included in reports of the weekly shop meeting—Reliance permits the union to post the reports on bulletin boards.

Finally, collect and file all grievances—even the ones which aren't written. Shop foremen can help by keeping a brief record of disputes and settlements. Entries should be made on a daily or weekly basis. You'll need the information for future negotiations or as evidence be-

### A Company Analyzes Discipline

**Allis-Chalmers Mfg. Co., Milwaukee, has a UAW contract covering 10,000 workers in varied occupations. It processed 1418 formal discipline cases from July 1, 1950, to Feb. 28, 1958. These passed beyond the informal foreman-employee stage:**

**FORMAL GRIEVANCE FILED**

| | |
|---|---|
| No layoff imposed | 500 |
| Voluntary termination (In lieu of discharge) | 31 |
| Total | 531 |
| Layoff imposed | 669 |
| Discharges | 218 |
| Total | 887* |

*Only 143 have been appealed to the company by union.

**REVIEW BOARD ACTION**

**Layoff cases appealed—**

| | |
|---|---|
| Rescinded | 19 |
| Modified | 14 |
| Sustained | 63 |
| Total | 96 |

**Discharge cases appealed—**

| | |
|---|---|
| Sustained | 18 |
| Reinstated with no back pay | 25 |
| Rescinded with back pay | 2 |
| Total | 45 |

**Demotion cases appealed—**

| | |
|---|---|
| Rescinded | 0 |
| Sustained | 2 |
| Total cases appealed | 143† |

†The union has appealed 6 of the 143 cases to an impartial referee. Of these, one layoff case has been sustained, and two are pending. In three discharge cases, one has been sustained and two rescinded with back pay.

fore the National Labor Relations Board if unfair practice charges are made.

### . . . Through Arbitration

Should grievances that can't be solved go to arbitration? Most industrial relations consultants claim an arbitration clause is a must, particularly if there's a no-strike pact.

But strong minded company men say no. Their thinking: "Such a clause indicates you don't have faith in your contract because you expect arbitration. This is an admission of weakness."

Asserts one personnel director: "Arbitration being what it is, the union will file on almost anything because it knows it stands a good chance of winning at least half the cases." He suggests a clause saying a "disinterested party" can sit in if the grievance can't be settled within the company. The mediator can recommend arbitration if it's really needed.

**Safety Measure**—Most companies feel safer with an arbitration clause—particularly if they have multiplant contracts. Grievances dealing with things like transfers, job standards, and seniority may become company policy and must move to a higher level for settlement.

The checklist on Page 128 sums up what should be included in an arbitration clause. If you skip part of the grievance procedure in reaching arbitration (it usually isn't advisable), tell your foremen and supervisors what happens. They'll be in a better position to handle future cases.

**Summary**—In making your contract work, your attitude toward it is most important. It's a business agreement and must be treated like one, say industrial relations people.

Larger firms, of necessity, have to be more impersonal in administering their contracts—that's why they are longer and specific. Small companies too often go the other way. Many small businessmen say: "We have such a good relationship with our men we don't really need a contract. We just sign to keep the union happy."

Mr. Vanden Bosch says such a view is shortsighted. "These outfits forget that the union men they get along with so well today may be replaced tomorrow by militant leaders who will stick to the contract like leeches."

"Climate" is important, but be sure it's climate with clauses, he advises. When you say what you mean and mean what you say, the job of making your contract work will be easier. A good rule: Write your contract tightly. Interpret it liberally.

## Clauses That Cause Trouble:

### Seniority . . . Easing the Bumps

**Maytag Co., Newton, Iowa, uses a departmental seniority system to avoid costly bumping: It cannot be done within labor grades. The lowest man in one grade can bump the lowest man in a lower grade. One man may not displace another unless he can do the new job without training—except in Grades 1, 2, and 3 where little training is needed.**

| LABOR GRADE | JOB CLASSIFICATION |
|---|---|
| 7 | Screw Machine Operator<br>Chucking Machine Operator<br>Centerless Grinder Operator |
| 6 | Broaching Machine Operator<br>Cutting Machine Operator<br>Turret Lathe Operator |
| 5 | Drill Operator<br>Boring Machine Operator<br>Milling Machine Operator |
| 4 | Facing Machine Operator<br>Gear Cutter<br>Grinding Machine Operator |
| 3 | Key Seater<br>Sorter<br>Threader |
| 2 | Laborer<br>Scale Operator<br>Lathe Operator |
| 1 | Janitor<br>Elevator Operator<br>Burrer |

## Clauses That Cause Trouble

Don't underestimate the noneconomic facets of your contract.

Noneconomic is a misnomer, claim labormen. Such issues are loaded with hidden costs. E. F. Scoutten, vice president and industrial relations director, Maytag Co., says labor turnover costs one company more than $500 per man. He adds:

"Slowdowns or controlled production, accidents and illnesses, absenteeism, excessive scrap, and low morale represent real costs and are of real concern to management." Such costs are created and magnified by ill-conceived contract provisions.

Here are some tips on preparing and handling three problem areas:

### 1. Discipline

What does it cost to hire, train, and fire a man? What is the cost of

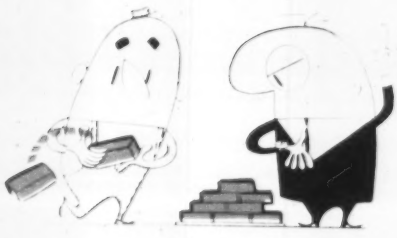
## Work Standards . . . Know What They Are

1. **MAKE A THOROUGH STUDY OF METHODS—**
   Avoid using only time studies and standard data sheets. Determine costs of production as well as methods.

2. **SET STANDARDS: DON'T NEGOTIATE THEM—**
   Let the union challenge standards after they've been in operation a while. Simple contract language makes it easier to keep the union from talking standards at the bargaining table.

3. **ADOPT THIS CONTRACT PHILOSOPHY—**
   The men are supposed to be working all the time unless they are specifically excused by management.

4. **REMEMBER—**
   The most efficient production standards may make for poor labor relations. In reviewing standards, ask yourself these questions:
   a. Do the men think they're working harder?
   b. Are they actually working harder?
   c. Were they working hard enough in the first place?



hiring and training his replacement? How much did it cost to arbitrate the case of the man who was dismissed? Was a walkout or a strike involved?

Those questions point up the wisdom of carefully handling discipline within the framework of your contract.

**Build Better**—The first thing you need is a sound discipline clause. Remember, the right to discipline, lay off, demote, or discharge for cause is yours. Don't give it away in bargaining. The contract clause can—and should be—simple.

**Make It Work**—Secondly, you need trained foremen and a concise program to make discipline work effectively. When a case comes up, get all the facts; make your decision quickly; follow up to see how the man and union react.

E. F. Ohrman, labor relations manager, Allis-Chalmers Mfg. Co., Milwaukee, is in Chicago today (May 19), giving the American Management Association his views on discipline (see table, Page 129). His ideas are worth your consideration.

He lists four items that should be a part of every policy: 1. Have rules for orderly operation. 2. Tell employees what the rules are. 3. Keep the rules up to date. 4. Emphasize training rather than punishment.

**Training Is Best**—Mr. Ohrman believes No. 4 is most important—and most neglected. "We punish when necessary (Allis-Chalmers fired 100 workers, including union officers and union bargaining team in 1947), but we rely principally on the training phase, which aims to correct and strengthen," he asserts.

Your success will depend on how you apply such a policy. Says Mr. Ohrman: "Be fair, not arbitrary; be firm, not weak-kneed; use rational processes, not expediency; emphasize the training phase of discipline. In fixing the penalty, don't delegate your responsibility to the arbitrator."

## 2. Seniority

Here is one of the few contract areas in which labor and management have mutual interest. But sloppy preparation gives the union a chance to slip in clauses which can cost you money.

Mr. Scoutten cautions against provisions that permit employees:

- To bump those of less seniority.
- To bid for jobs in their own job classifications.
- To insist on seniority as the primary determinant in filling of jobs or in transfers.
- To assume jobs on trial periods of more than a few weeks.
- To claim exclusive jurisdiction over jobs they perform regularly or occasionally.
- To have certain actions identified as being convenient to the company (thus subject to penalties).
- To receive "average earnings" for temporary work in a different job classification.

Those are the hidden cost areas. What kind of seniority system you use to handle them depends on your company's size. Departmental or occupational seniority (or a combination of both) probably is the best bet for all but small plants. Here are some tips:

**Pull Union's Fangs** — Even though seniority is a "mutual interest" area, make it your responsibility to preserve your rights to manage. Don't ask the union to help you formulate seniority provisions. Set up the plan and write the clauses first, then ask the union if it agrees or if it has a better answer. If your plan is fair, chances are the union will string along.

**Ease the Bumps**—If possible, set

## How Do You Build Today?

**These firms start preparing for the next contract as soon as a new one is signed:**

a. 33 per cent of companies employing more than 5000.

b. 12 per cent of companies employing under 5000.

c. 4 per cent of companies employing under 1000.

**These firms start trying to second guess the union six months before their contract expires:**

a. 64 per cent of companies employing more than 5000.

b. 86 per cent of companies employing under 5000.

c. 47 per cent of companies employing under 1000.

**These firms wait for the patternmakers to settle and follow them blindly:**

a. 3 per cent of companies employing more than 5000.

b. 2 per cent of companies employing under 5000.

c. 49 per cent of companies employing under 1000.

Estimated by Employers Association of Detroit.

up a departmental seniority system which allows no bumping within a wage or labor grade. It will minimize expensive waves of bumping. Maytag's plan (Page 130) is a simple one.

**Short Timers**—Temporary transfer rights are another overlooked phase of seniority clauses. Seniority status, pay rates, length of time, and reasons for transfer are important.

**Summary**—No matter what seniority clauses cause you trouble, here are five things to remember:

1. Ability to do the job should come first (seniority second) in promotions and transfers.
2. Prepare thoroughly for negotiations to avoid loopholes and to keep the contract language simple.
3. Educate and refresh your foremen on seniority matters.
4. Build a sound grievance system and apply it fairly.
5. Apply seniority with your heart as well as your head.

### 3. Work Standards

How much do you write into the contract on standards before you find yourself negotiating them? asks Ken Porter. The best answer seems to be: Just enough to explain your theory.

General Motors Corp. takes this position: The men are working all the time unless they are specifically excused. The philosophy is good, but Owen Fairweather points out a difficulty in applying it. He thinks too many industrial relations men don't know enough about standards. He says:

"To protect themselves, they incorporate the procedures of industrial engineers directly into the contract. This only multiplies the chances for grievances because it makes for involved lingo with lots of loopholes." The observation especially applies to firms with incentive systems.

**Prepare Better** — Knowledge of standards will help you equate men and machines to find out who's doing what. It keeps you from running for help—usually to the union. Warns Mr. Scoutten: "Avoid, as you would the plague, any arrangements whereby you create a joint committee to administer a program of job evaluation or a joint committee to undertake joint time studies and create jointly resulting labor standards."

Sound method studies, particularly in nonincentive shops, will keep you from asking the union for a "helping hand." Adds a Cleveland producer of electrical components: "The only way to increase productivity is to improve standards. Once workers get into the habit of doing work a certain way, they develop their own standards. You can't change them without giving the workers a cash incentive."

**Make It Work** — That's why preparation is important in applying and changing standards. You can avoid trouble in setting new standards by asking yourself these questions:

- Do the men think they're working harder?
- Are they actually working harder?
- Were they working hard enough in the first place?

**Temporary Rates** — Short run jobs and experimental or prototype work also cause headaches. Because of their changing nature, they are sitting ducks for grievance-conscious stewards.

If you're having such trouble, take a look at the clause that Dana Corp., Toledo, Ohio, put into its contract: "Temporary piecework rates for a specified number of pieces may be established during the start of operations on new parts or on old parts that are being reprocessed."

### Summary

GM's negotiators have been preparing three years for their present negotiations. How long have you been getting ready for yours? Too often, agreements are negotiated on the "let's see how little we can settle for this time" theory and little, if any, preparation.

The Employers Association of Detroit shows in the accompanying exhibit that larger firms start preparing for the next contract almost as soon as the last one is signed. Smaller companies tend to be more casual about preparation and are apt to follow big industry patterns.

Besides preparing thoroughly for negotiations, you have to create a climate of understanding among the men who will administer the contract. Do those two things, and you'll make economic provisions pay off and protect yourself from the hidden costs of noneconomic clauses.

A good job will ultimately show up in the profit columns of your firm's financial statement. Successful labor relations are an important part of profitable business.

# *Here's one way to lick the tobacco surplus!*

The only thing operating in Department 3 is the cigarette machine. The men have been standing around since they clocked in this morning. Loafers? By no means. It's just that no work has reached their department.

Yet some other departments have more work than they can handle. Overtime on the one hand, idle time on the other. Think what scheduling like that does to profits!

Management finds out about these things, of course – when it's too late. But with Keysort punched-card controls they need not occur at all. Keysort work-load summaries enable you to schedule production jobs by department *in advance*. Knowing what's ahead, you can transfer men, plan extra shifts or layoffs so that each man-hour pays off fully in work done.

Keysort punched cards – speeded by the new Keysort Data Punch which simultaneously imprints and code-punches production or sales information – offer the simplest, most flexible means of obtaining the fast, accurate, comprehensive reports you need for complete control of your business and profits. Without disrupting present accounting methods. At remarkably low cost.

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# Seventy-five Years ◇◇◇

TEN MILES an hour was "speed" in 1883 when Wyman-Gordon started to make forgings for the high-wheel bicycle. Through the 75 intervening years forgings have made important contributions to the phenomenal advances in propulsion. Progress from the first "horseless carriages"...from the early "flying machines"...to the supersonic speeds of today ...would not have been possible without forgings produced by the most advanced techniques of the day.

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STEEL

May 19, 1958

# Technical Outlook

**CAGE-ZONE REFINING**—That's the name for an experimental technique which combines levitation melting and zone refining. It has been used to purify metals such as titanium, zirconium, and columbium which would react with a refractory container. Longitudinal fins are machined on the bar to be refined. They serve as a cage for the metal inside, which is melted and refined while suspended in space within the turns of an induction coil. Surface tension holds the molten metal to the cage fins, which don't melt because they dissipate heat so quickly.

**FORGED SILICA**—Fused quartz can now be forged into such shapes as cubes, rods, prisms, and hollow hemispheres. The savings over grinding and cutting may approach 95 per cent, and the material has fewer bubbles than unforged quartz.

**HIGH TEMPERATURE PROGRESS**—Chromium may some day come into its own as a high temperature material once its lack of room temperature ductility is overcome, say investigators at Armour Research Foundation, Chicago. Past work concentrated on high purity. Latest efforts show that controls on melting, forging, and warm working improve the ductility of commercial quality chromium and alloys which contain up to 0.5 per cent nitrogen.

**A $12,000 IDEA**—When Indiana Gear Works, Indianapolis, replaced the two metal lids on its vapor degreasing tanks with hinged and counterweighted plastic lids (to keep the tanks covered more of the time), consumption of degreasing fluid dropped from 8 bbl to 1 bbl a month. Evaporation had been costing the company $12,000 a year.

**SINTERED METAL FIBER SHEET**—When impregnated with an epoxy resin, its bend strength is 75,000 psi and impact resistance is 35 ft lb per inch of notch, says Armour Research Foundation, Chicago. Made of lead fibers, the sheets can be used for battery plates of superior quality. The foundation also reports that the S.O.S. Co., Chicago, is building a pilot plant to make metal fiber sheets continuously. Ferrous sheets can be 97 per cent porous; bonding takes place during sintering.

**OXYGEN-IMPROVED STEEL**—Jones & Laughlin Steel Corp. finds the low carbon steel produced in its oxygen converters enough better than its open hearth steel to be offered as "restricted specification" material. High ductility (for deep drawing), and low phosphorus, sulfur, and nitrogen content are characteristics of the basic oxygen strip.

**VERSATILE ALUMINUM**—Among its newer uses: Honeycomb cores for curved radar antennas, watchcases, and haulage cars for mines.

**SUPERFAST ORE GRINDING**—In Finland, nonferrous ores are being ground in experimental ball mills at speeds up to 2000 per cent of the critical speed. (Critical speed is reached when the grinding balls go all the way round the mill by centrifugal force. Typical production grinding is below the critical speed.) The mills show greatly increased efficiency at high speeds, and when used without balls (autogenous grinding), the charge may even form its own protective liner, reducing mill wear.

**COLD BONDERITE**—A cold cleaner and a new Bonderite treatment make it possible to apply a prepaint phosphate coating to sheet metal at a great saving in fuel costs. Equipment remains the same, but steam requirements are reduced as much as 70 per cent.

**CUTS RESURFACING COSTS**—The Aircraft & Electronics Div. of Kaiser Engineers saves $11 every time a clutch plate on a Keller machine needs resurfacing. Cadmium plating at $4 a plate replaces copper surfacing at $15. With six clutch plates per machine needing resurfacing every 60 days, the annual saving on 22 machines comes to $8700.

Metalworking Outlook—Page 79 Market Outlook—Page 195

**OLD METHOD**

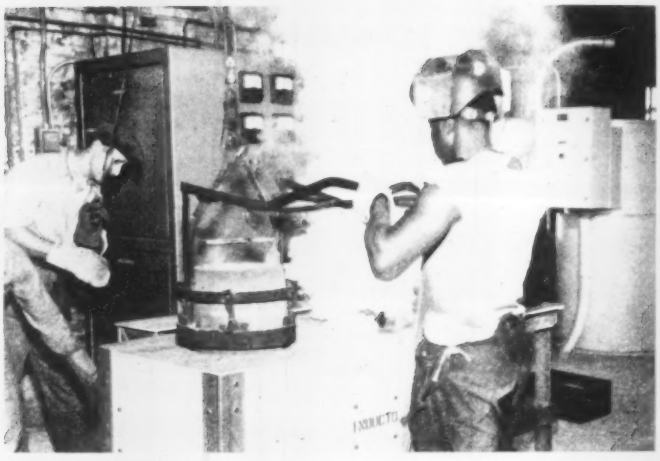
Four oil-fired melting furnaces

**NEW METHOD**

One induction melting furnace

## SAVED

$10,000 a year



Hydraulic pusher lifts crucible of molten metal to top of furnace where worker will lift it off for pouring. Power has been applied to second crucible where metal is starting to melt

COST CRISIS . . . How To Beat It

# Reduced Costs Keep Foundry

**Installing an induction furnace for melting nonferrous metal allowed manufacturer of cast bushings to cut production costs, lower customer price on one part 8 per cent**

IT isn't easy to stay competitive in an industry that makes things like cast bronze bushings and bearings. Bushings Inc., Philadelphia, has had a cost cutting program since 1952. The payoff for mechanization and more efficient foundry methods has been a 25 per cent reduction in overall costs.

Savings, which are passed on to customers in lower prices, have been realized without laying off personnel. Two examples of improved methods that Bushings Inc. management has instituted: Centrifugal casting, better sand handling.

**Melting Unit** — The latest addition to the program is an induction furnace that will save an estimated $10,000 yearly in melting costs under normal production conditions. At that rate, it will pay for itself in four years.

The company recently cut 8 per cent off the list price of an automotive spring-eye bushing. About half the reduction was due to lower melting costs.

The induction unit replaces four oil-fired melting furnaces. Power costs are three times the fuel costs on the oil-fired units, but the overall saving more than offsets the increase.

**Gains**—It used to take the foundry 75 minutes to melt the first heat and 50 to 55 minutes for each succeeding one. With the new setup, heats take 22 to 23 minutes each.

Metal loss during melting is less in the new unit. Biggest gain in that area is in the remelting of chips, which usually results in large metal losses. The induction furnace has cut them considerably.

One large part takes a 250-lb casting to get a 47-lb finished part.

## Gains:

**Labor costs reduced.**

**Melt time cut 60 per cent.**

**Physicals of cast metal boosted 10 per cent.**

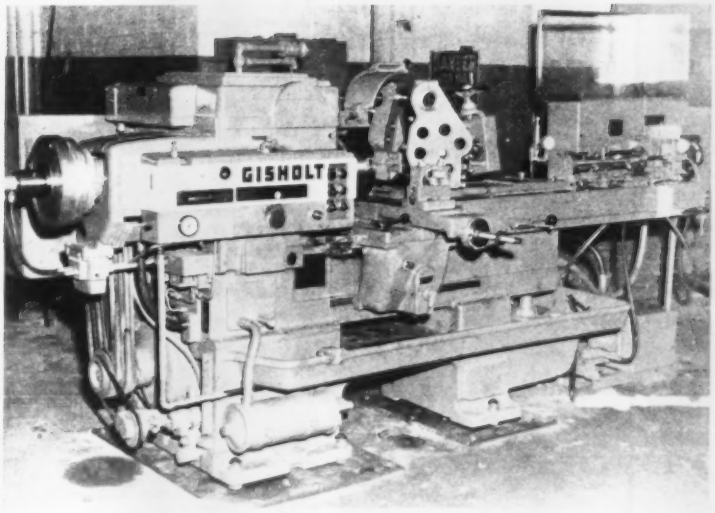
**Metal loss during melting reduced.**

**Floor space requirements cut in half.**

**Efficiency of melting chips improved.**

## Immediate Results:

**Cost reduction passed on to customers in reduced prices.**




**Bushings Inc. maintains a complete machine shop at its Philadelphia plant to alter stock bushings by cutting to length, grooving, boring, turning, milling, and drilling. Management recently added an automatic cycle lathe (a No. 3 Gisholt) and found it cut costs on some turning operations in half**

# Competitive

Bushings Inc. has saved the customer 5 per cent on price because the turnings can be more efficiently remelted.

**More Gains** — Induction melting allows close control of metal analysis. Since the heat is generated in the metal, there is no excess or external heat to cause oxidation of some of the alloys. The electromagnetic stirring action of the furnace assures a uniform, homogeneous alloy. At Bushings Inc., the equipment has boosted the physical properties of the cast metal about 10 per cent.

Another advantage: The unit takes about half the floor space occupied by the old installation.

**Induction Furnace** — The induction unit (it's made by Inductotherm Corp., Delanco, N. J.) has two removable crucibles. In the melting (lowered) position, each crucible is surrounded by an induction coil.

When the charge in one position is ready for pouring, a hydraulic cylinder raises the crucible of metal so it can be carried to the molds for pouring.

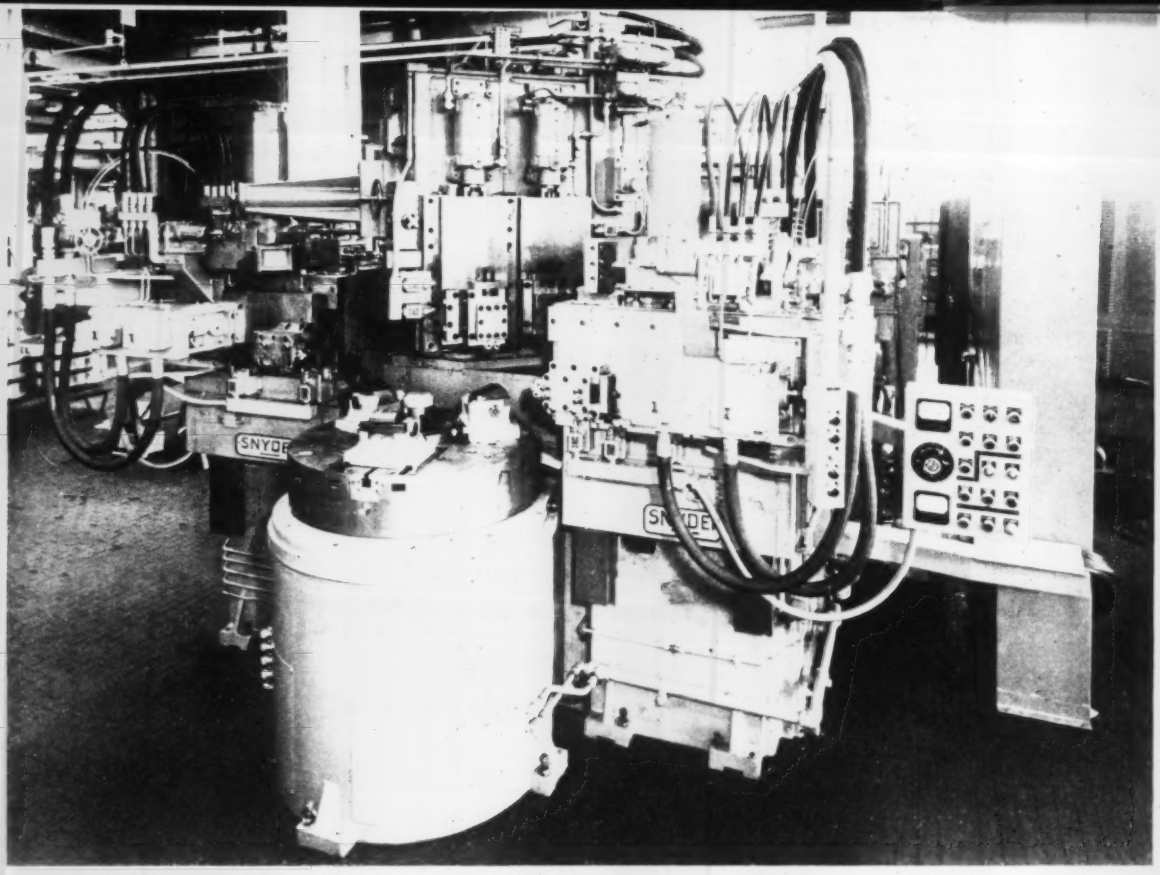
While one crucible is being emptied and recharged, the other crucible's charge is being melted.

**Management Sold**—The proposed cost and quality advantages of the induction furnace convinced management it would fit into the continuing cost reduction program. The projected saving has proved to be more than realistic.

An added benefit: A. G. Eberle, plant superintendent, declares: "We've had an increase in morale due to better, cleaner working conditions that you just can't evaluate in dollars and cents."

## COST CRISIS COMPETITION

This article is part of a campaign to help industry achieve lower unit production costs. The accompanying example and others to follow are samples of what the editors of STEEL are looking for in their nationwide search for companies that have brought about important cost savings through more efficient use of capital equipment. Does your company qualify? If, so, enter the Cost Crisis Competition. Write to the Cost Crisis Editor, STEEL, Penton Bldg., Cleveland 13, Ohio, for your awards kit.



Snyder wheel turning machine has rotating worktable and three compound slides, two of which are tracer controlled

# Machine Slashes Wheel Turning Time

**It rough and finish machines a 750-lb railroad wheel in 2 minutes 15 seconds. Only operation needed before mounting on the axle: Boring out the hub**

WITH a 750-lb railroad wheel selling for about $60, you have to keep machining time at a minimum to make any money.

Snyder Tool & Engineering Co., Detroit, has come up with a turning machine that makes short work of the job. It processes wheels 33 to 42 in. in diameter in 2 minutes 15 seconds.

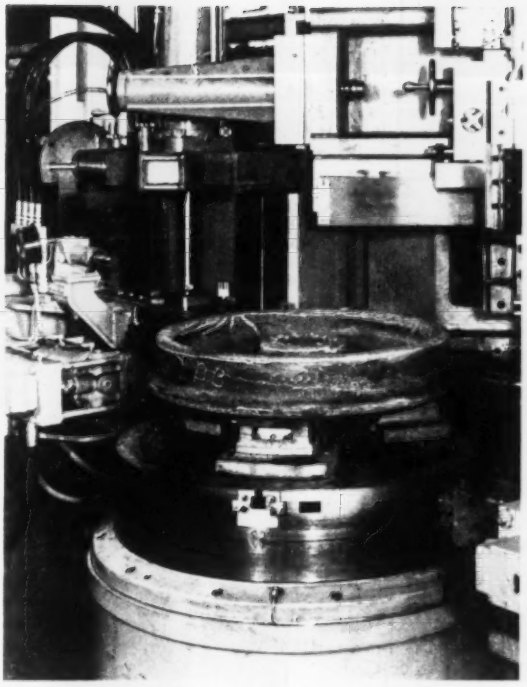
It's designed to machine 40, 50, and 70 ton wheels (car load ratings), made of cast or forged steel, with single or double taper treads. The first unit of this type will be delivered to American Brake Shoe Co., Birmingham.

**Machine**—Basically, the machine consists of a worktable driven by a 125 hp, variable speed motor and three compound slides carrying tool blocks.

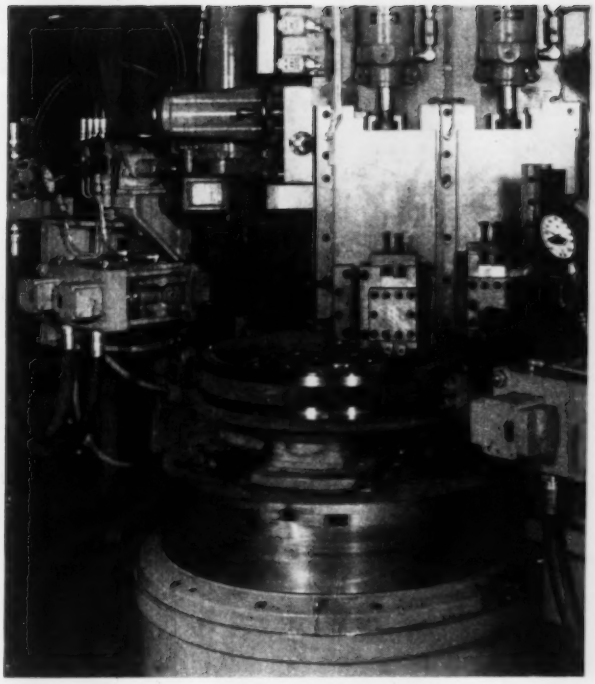
The compound slide above the worktable carries two tool blocks. One block has two tools that rough and finish face the hub. The other has three tools—two that rough and finish face the rim and another that machines the rim radius.

**Tracer Controls**—The left slide carries a single tool that turns the tread taper. It is fed down at a constant rate and crossfed under the control of a template-controlled servovalve. The template can be changed to suit a variety of shapes.

Two tools are mounted on the right slide. One turns the throat radius and part of the flange radius; the other blends the flange radius and cuts the flange surface. The



Centrifugally cast steel wheel is chucked on machine. Three hydraulically operated jaws grip it on the inside of the flange



Turning down a wheel. Left tool turns tread taper; right tools blend flange radius and turn flange; top tools face the rim and hub

Some of the castings and wheel processed on the Snyder unit. Engineer checks wheel circumference with railroad tape measure

slide is fed down at a variable rate. Profiling is done through a template and tracer mechanism.

**Work Clamping** — An unusual table clamping arrangement is used to withstand the forces generated during machining. The wheel is set over a flexibly mounted center hold-down post on the worktable. Jaws in the post expand hydraulically to engage the wheel bore and snug the wheel down on three spur-type rest buttons.

While this operation is taking place, a hydraulically operated, three jaw equalizing chuck engages the inner flange surfaces to center and clamp the part.

**Quick-Change Settings**—Railroad wheels can be turned in three tape (wheel diameter) sizes within each standard diameter (33 to 42 in.). The Snyder machine has provisions for quick-change settings for machining wheels to the next smaller tape size when porosity or surface cleanup problems are encountered.

Tracer cam settings are provided for three tape sizes for both right and left tracer heads. The travel for the rear tool head on the facing slide above the worktable has two quick-change settings for proper blending of the radius chamfer for the three tape sizes.

Additional quick change controls for varying flange and hub facing depths in 1/16 in. increments are included to increase the versatility of the unit. Hydraulic counterweights and smaller diameter tool slide operating cylinders provide maximum compactness.

**Speeds and Feeds**—The turning operation is done dry at 250 sfpm. Mechanical chip breakers on the tools prevent the formation of large chips. Turning and facing feeds are 0.065 in. per revolution.

## Newer Brazing Metals for Heat-Resistant Alloys

| ALLOY TYPE | Ag | Au | Pd | Cr | Mn | Cu | Ni | Li | Si | B | Melt (°F) | Flow (°F) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SILVER-COPPER-LITHIUM | 92.3 | | | | | 7.5 | | 0.2 | | | 1435 | 1635 |
| SILVER-PALLADIUM | 90.0 | | 10.0 | | | | | | | | 1835 | 1950 |
| MANGANESE-NICKEL | | | | | 70.0 | | 30.0 | | | | 1840 | 1875 |
| NICKEL-CHROMIUM-SILICON-BORON (AMS 4775) | (Bal. Fe) | | | 16.0 | | | 72.5 | | 5.0 | 3.5 | 1825 | 1840 |
| GOLD-CHROMIUM-NICKEL | | 72.0 | | 6.0 | | | 22.0 | | | | 1785 | 1835 |

# Brazing Alloys Tackle Heat Barrier

**Heat-resistant metals create problems in making assemblies by brazing. Here's a rundown on some of the newer filler metals that are doing the job in the high heat range**

FABRICATORS are taking a critical look at some of the newer brazing filler metals for production joining of heat resistant alloys.

Problem applications include aircraft and missile parts and a variety of industrial equipment.

Speaking at the Midwest Welding Conference, sponsored by Armour Research Foundation, Chicago, A. M. Setapen, manager of engineering, Handy & Harman, New York, listed five groups of filler metals that may fit the high temperature requirements:

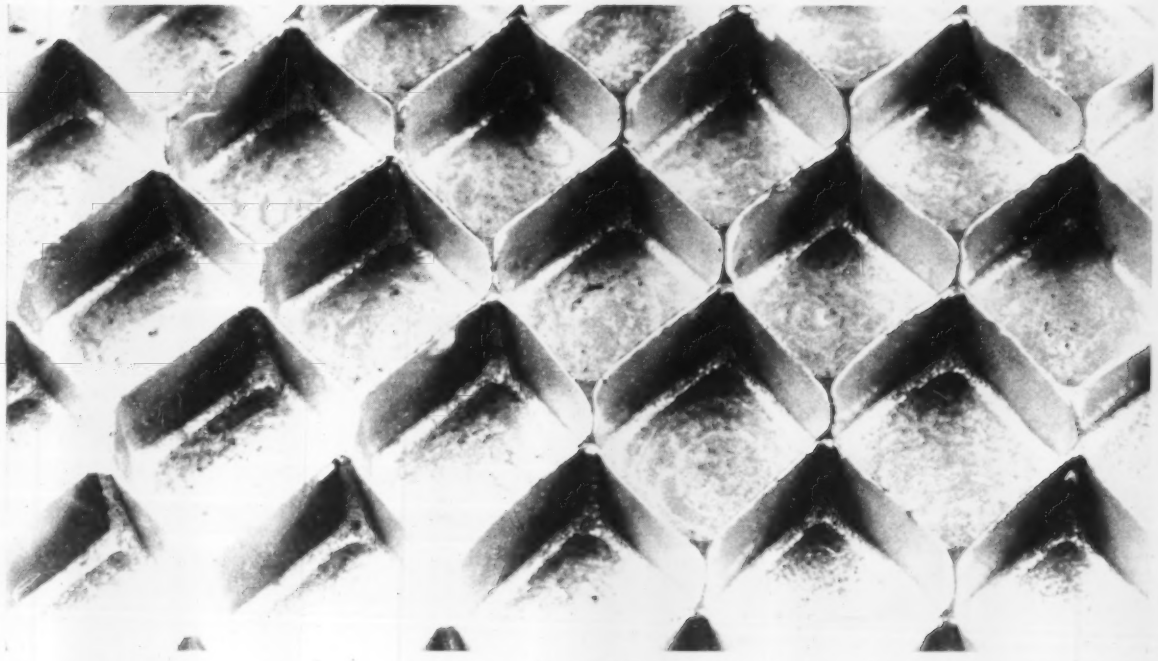
**Ag-Li Alloys**—Lithium has become an important element in filler metals for brazing heat resistant alloys. Small amounts markedly improve the fluidity and wetting ability of many standard alloys. With lithium modification, it is possible to braze stainless steel in an atmosphere, without flux, at a temperature as low as 1600° F.

The lithium alloys typically contain 0.2 per cent of the element. One such metal—silver with copper and lithium—is rapidly gaining favor for brazing honeycomb panels of 17-7 PH stainless. Its flow temperature corresponds to that required for the heat treatment of precipitation hardening steel. Joints retain a tensile strength of 35,000 to 40,000 psi at 900° F (short time test) which is the maximum service temperature for 17-7 PH. Also, the filler metal readily wets in vacuum, dry hydrogen, or inert gases without the use of a fluxing compound.

Because of its high fluidity, the silver-copper-lithium filler metal readily penetrates small gaps between the parts of a brazed sandwich. It represents a marked improvement over silver-manganese which does not easily wet 17-7 PH steel, explains Mr. Setapen. Joints of the sterling-lithium alloy are more corrosion resistant than those of silver-manganese. Fabricators have reported that use of the lithium alloy in place of silver-manganese has reduced a 45 to 50 per cent reject rate on brazed honeycombs to less than 10 per cent.

There is a disadvantage: The high fluidity of the alloy causes excessive run-off on large curved surfaces. If this problem can be licked, costs may be lowered to the point that brazed honeycomb could become a standard structural material.

**Other Li Alloys**—Small amounts of lithium have proved valuable

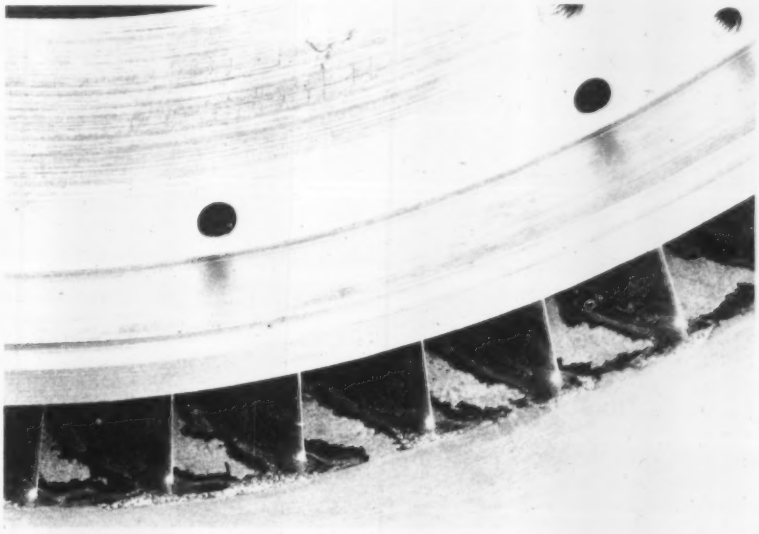


Honeycomb panel brazed with silver-base lithium alloy. Cutaway shows uniform filleting and good penetration into small gaps

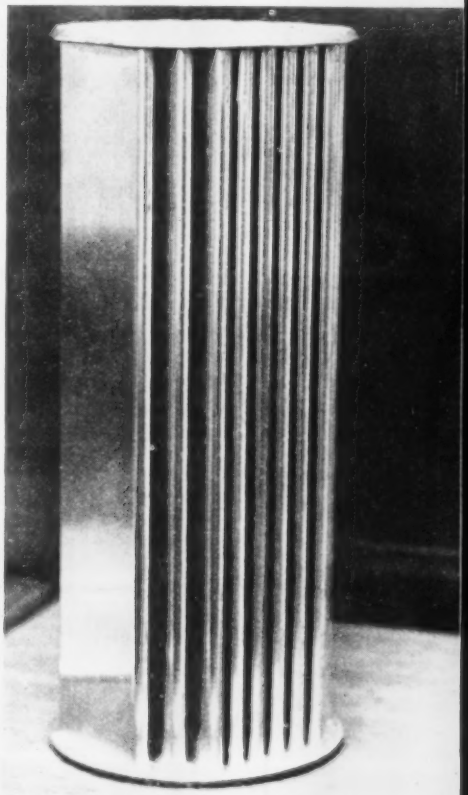
when added to the silver-copper eutectic, AMS 4772, and silver-manganese (85-15). These materials are being used for brazing stainless steel bellows, instrument assemblies, hydraulic lines, and a variety of jet engine parts.

Another development is the silver-lithium binary, containing 2 to 3 per cent lithium. This alloy shows considerable promise for brazing titanium and its alloys. Peel strength of the metal isn't satisfactory for some applications, but work is underway to improve it.

**Ag-Pd Alloys** — Silver-palladium



Diffuser vane and shroud assembly of 4130 molybdenum steel was brazed with AMS 4775 high-nickel alloy at 2100° F



Heat exchanger of Type 316 stainless for high temperature service. It was brazed with a nickel-silicon-boron alloy at 1925° F

and silver-palladium-manganese alloys have been used in England and are of experimental interest here. Adding palladium to silver increases its melting temperature, strength, and ability to wet iron and nickel-base alloys. Manganese further improves wetting.

The alloys do not penetrate or dissolve the base metal to any extent. Experimenters report that joints appear to be less susceptible to crevice corrosion attack than those made with silver-manganese alloys. Their resistance to oxidation is like that of other silver-base alloys.

**Mn-Ni Alloys**—Manganese-nickel (70-30) is being used for joining stainless steel, Inconel, and other heat-resistant alloys. At elevated temperature, it retains much of its high joint strength (55,000 to 65,000 psi at room temperature), and resists oxidation better than silver-copper-lithium or silver manganese filler metals.

Its properties fall midway between those two filler metals and the nickel-chromium-silicon-boron alloys. In oxidation resistance, it is better than the high-silver metals but not as good as the Ni-Cr-Si-B group. However, it has less tendency to dissolve or penetrate the base metal (highly important with thin sections) than do the high-nickel alloys.

The material is expected to find extensive use in brazing heat exchangers, rocket motor parts, clad metals, and turbine blades.

**Ni-Si-B Alloys** — This group of alloys contains nickel as the main constituent, with silicon and boron as the alloying elements. In two of the alloys, part of the nickel is replaced with chromium to provide superior oxidation and corrosion resistance.

In hardness and strength retention in the 1600 to 1800° F range, the high-nickel materials are unsurpassed. However, they attack many base metals by intergranular penetration and solution.

Typical applications for these alloys: Vane and shroud assembly of 4130 chrome-molybdenum steel brazed at 2100° F; a nozzle assembly of Hastelloy-25 and Type 304 stainless brazed at 2150° F; and a flat, tubular stainless steel heat exchanger brazed at 1925° F.

**Gold Alloys**—Filler metals with high gold content are being used when intergranular penetration of the base metal cannot be tolerated and when assemblies must resist oxidation around 1600° F.

The high gold content makes these materials expensive, but in most cases, the value of the assembly and the importance of reliable high-temperature performance outweigh the cost of the alloy needed to make the joint.

Compared with the high-nickel alloys, the gold filler metals have lower hardness, better ductility, and less tendency toward intergranular penetration. They can be produced in any variety of wrought forms, in contrast with nickel-boron-silicon alloys which are available only in powder, sintered powder, or cast forms. The gold alloys also have good wetting and flow characteristics.

Here are examples that account for some of the interest in the performance of gold-nickel-chromium filler metals:

Lap joints between Inconel and stainless, brazed in a helium atmosphere at 1900° F without flux, were exposed to air at 1600° F for 88 hours. There was no adverse effect on the joints.

Photomicrographs of other joints in Inconel and stainless steel assemblies show only slight grain boundary attack in the stainless, but the extent was negligible considering the long brazing cycle employed. There was no intergranular penetration in the Inconel part of the assembly.

Other stainless joints brazed with the gold-chromium-nickel filler metal and heated in air for seven days at 1600° F retained a tensile strength of 20,000 psi when tested at 1600° F. Such performance is excellent at this temperature, explains Mr. Setapen.

Some advanced applications for which the gold filler metals are being considered include parts for rocket motors, missiles, supersonic aircraft, and nuclear reactors.

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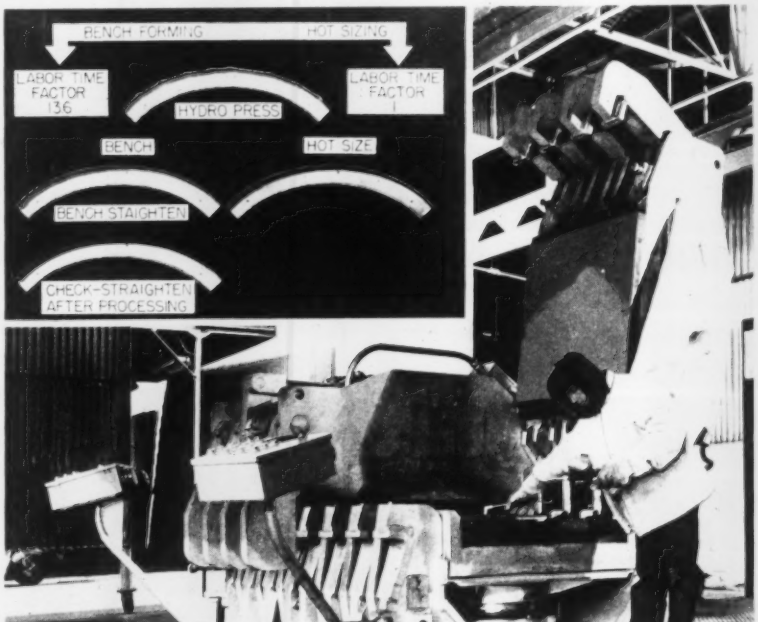
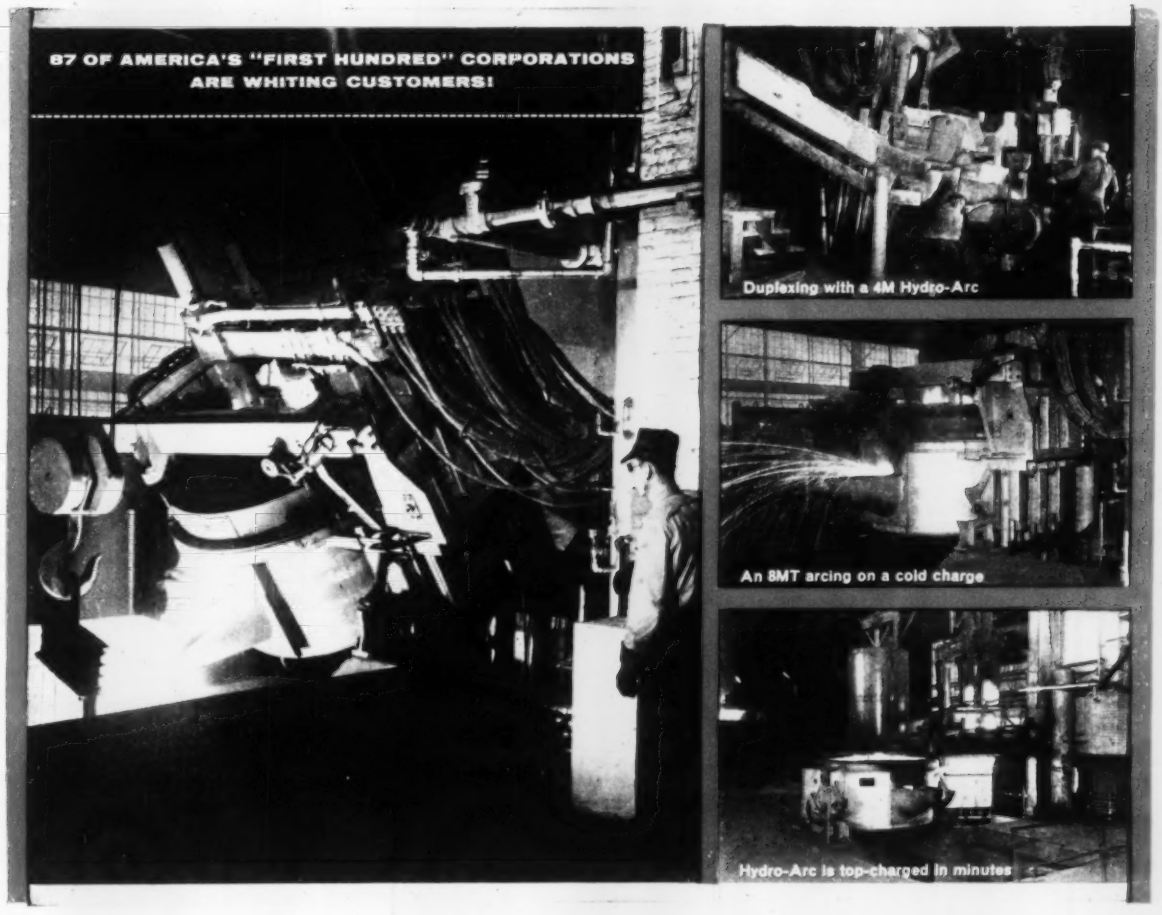



**A HOT-SIZING PRESS** speeds precision forming of titanium and high temperature steel parts for aircraft and missiles—see inset. Scrap reduction and the use of low cost dies are other benefits. North American Aviation developed the machine, and Sheridan-Gray Inc., Torrance, Calif., produces it under license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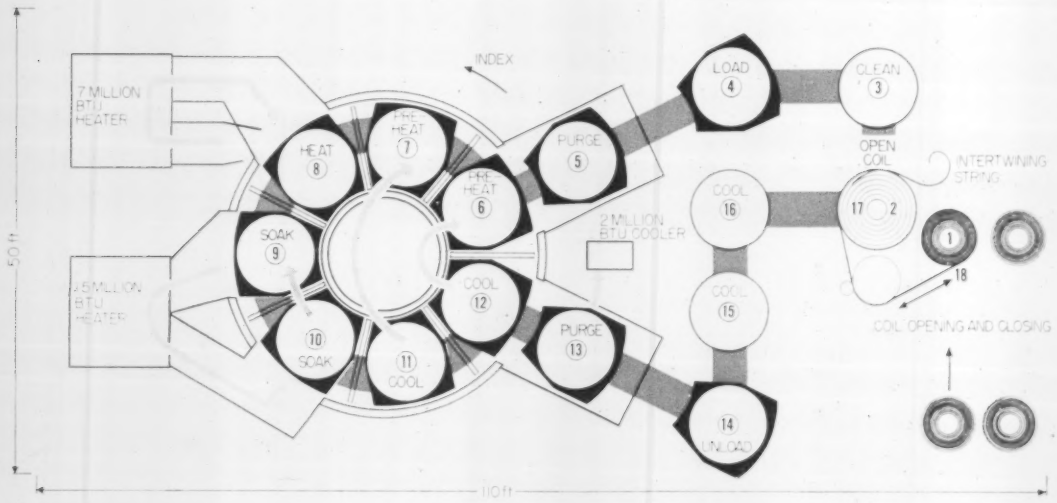
# WHITING

FOUNDRY EQUIPMENT




**The Lee Wilson opened coil annealing system begins and ends at the coiler-uncoiler (2, 17). After the intertwined string is removed, the coils are sent through a cleaning station (3), then placed on a platform (4) for the trip through the annealing furnace. Arrows in the furnace show the paths of heat flow**

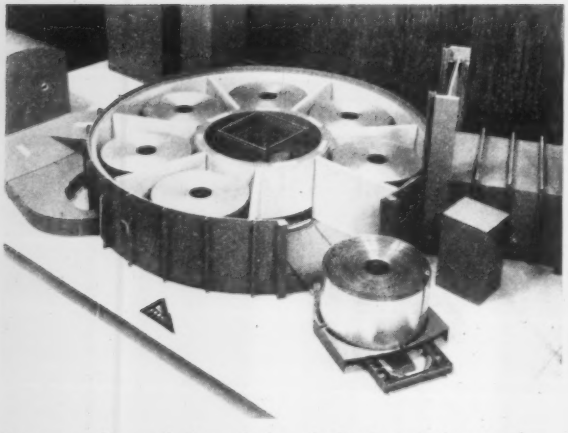
# Coils Opened for Annealing

THE SUCCESS of this tonnage steel annealing system depends on a piece of string.

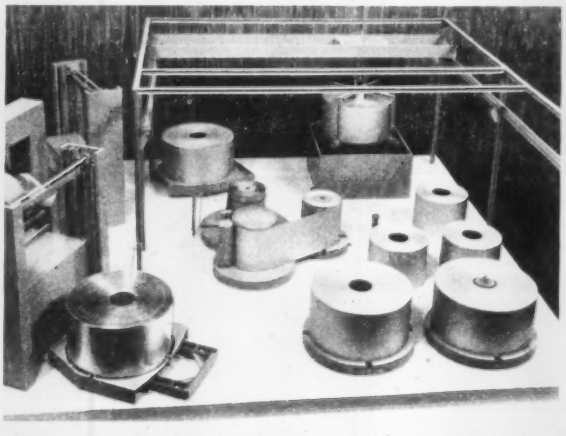
**Problem** — Attempts to separate the turns in a coil to let annealing gases pass through had been unsuccessful until engineers at Lee Wilson Engineering Co., Cleveland, came up with an idea: A nylon fishing line is wound into the coil, then pulled out, leaving the turns of steel separated.

**Only a Beginning**—STEEL has told the economic story of the Lee Wilson opened coil annealing system (Apr. 28, p. 104). Many of the mechanical details are revealed in the illustrations on this page.

As the drawing shows, the string is only the start. After it comes a base for the coils, and a rotary hearth furnace that conserves heat by the recuperative principle. The system is said to be unlike any used before. Its economic advantages: A small number of coils are tied up in processing, and per ton operating costs are low.



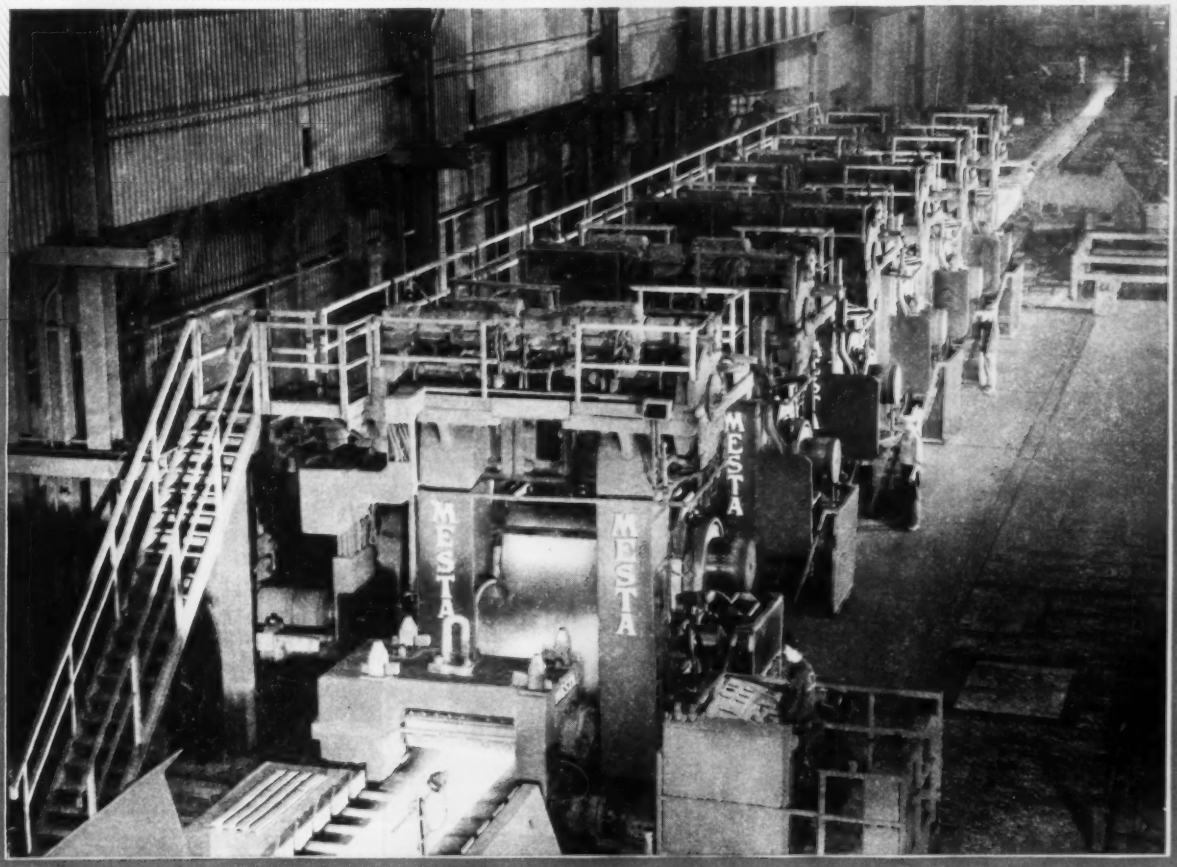
**Cutaway shows design of the platform and charging car**



**Coiler-uncoiler, cleaning, loading, and unloading stations**

# HOT STRIP MILLS

## Designed and Built by MESTA




**MESTA 56" Four-High Hot Strip Mill for Rolling Stainless, Silicon, High-Alloy, and Carbon Steels at Allegheny Ludlum Steel Corporation**

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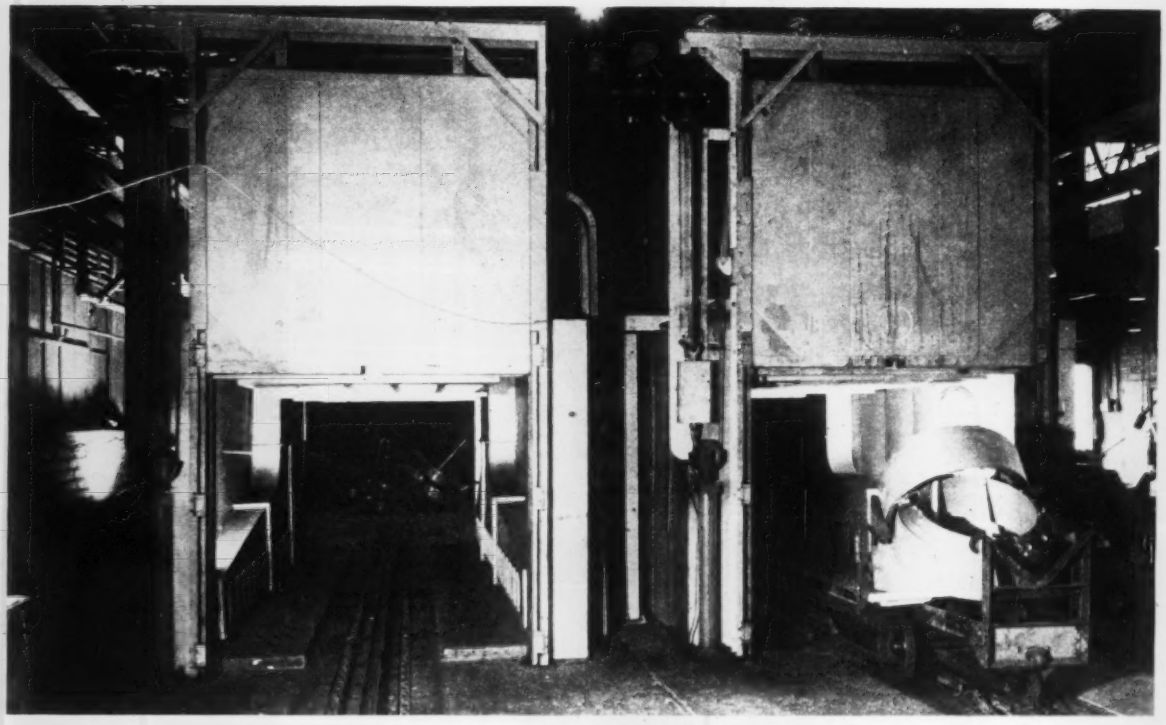

Coils are carried through these drying ovens on trucks. The floor conveyor chain will not move unless the doors are open

# Trucks Speed Coil Drying

**Continuous process for strip steel is said to be efficient and economical. Interlocked controls synchronize operation of the doors and the conveying system. Initial cost was low**

COMPACT OVENS are drying 20,000 lb of coiled strip steel an hour at Carpenter Steel Co., Reading, Pa. Trucks carry the moisture laden stock on a time schedule.

The system features an efficient method of material handling, installation in a fairly small space, and low initial and operating costs.

**Continuous Feeding** — Drying takes place in two, direct gas fired ovens. Each is equipped with two strands of a floor conveyor chain that has pusher dog assemblies. They engage with pusher plates on the trucks to move the units through the drying stages.

Each truck load of steel progresses through four stations at 7½-minute intervals. The station positions are fixed by a limit switch at the conveyor drive sprocket. Cycle time can be changed by a variable speed drive on the conveyor.

A single track runs between the two strands of the conveyor. The front and rear wheels of the truck ride in this track, assuring straight passage through the oven.

**Oven Design**—W. W. Sly Mfg. Co., Cleveland, built the units. Exit and entry lift doors are air operated. Interlocked controls keep the conveyor from operating unless the doors are open.

Each oven is designed to dry 10,000 lb an hour. Heat is supplied by a heater with a capacity of 1½ million Btu an hour. Maximum temperature is 450° F.

Ductwork is sized and located to assure a uniform temperature over the work. Circulation is provided by a 16,000 cfm fan. Another fan exhausts the moisture and products of combustion.

The only manual handling required is positioning the trucks at the start of the cycle and removing the loads after drying.

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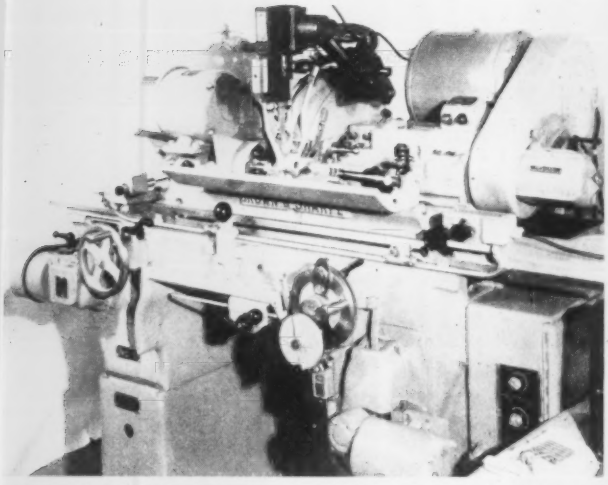

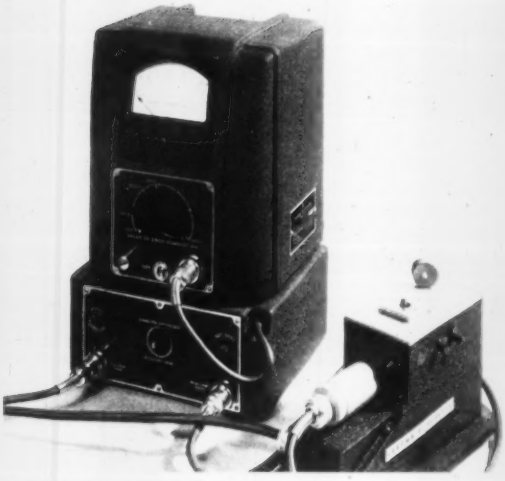

When the operator pushes the small lever at bottom center (photo at left), he sets up controlled distortion of the machine casting. It gives fine feed for close tolerance grinding. Gaging units (right) tells when part is to size—bore gage is for automatically mating cylinders to precision bores

# Millionths Made Easy

GRINDING machine operators have trouble making parts to limits of plus or minus 10 millionths. Yet such tolerances are becoming common, particularly in missile, fuel injector, and similar precision jobs.

Engineers at Brown & Sharpe Mfg. Co., Providence, R. I., have solved the problem for some applications by combining a slightly modified No. 5 plain grinding machine, a newly developed fine crossfeed, and a special gaging system.

**Results**—The combination enables a semiskilled operator to:

1. Plunge grind parts to plus or minus 10 millionths.
2. Plunge grind parts to fit mating holes within plus or minus 20 millionths.
3. Do fitting or finishing operations on parts, removing as little as 10 millionths stock from each piece. Tolerance is still 10 millionths. Parts can even be taken from the machine, replaced, and as little as 10 millionths additional stock removed.

**Here's How**—The machine has all its alignment factors carefully zeroed in. Electralign helps control taper. Isolation mountings keep external vibrations out; the coolant is filtered and maintained at constant temperature.

The developments that make major contributions to precision are called Ceda Size (for fine feed) and Electromate (for gaging mating parts). The operator loads the workpiece and puts an electronic caliper on it. He then grinds (conventionally) until the part is roughly 50 millionths oversize.

When the Ceda Size lever is depressed, a load is applied to the machine castings that gives a controlled, fine feed. The operator continues to push this lever, watching the amplifier reading of the caliper measurement. When it reads zero, the work is to finished size within 10 millionths.

**Mates**—When the ground cylinder is to be mated to a bore, the Electromate is combined with Ceda Size. It consists of a computer and a bore gage with a range of 3/16 to 1 in. The bore gage and caliper are tied into the computer and amplifier. When a bore is placed on its gage as the operator pushes the Ceda Size lever and grinds it to

(*Please turn to Page* 151)

Stock catalog items are pulled from shelves and assembled into order lots on the conveyor. Orders are filled and shipped within 24 hours after they are received

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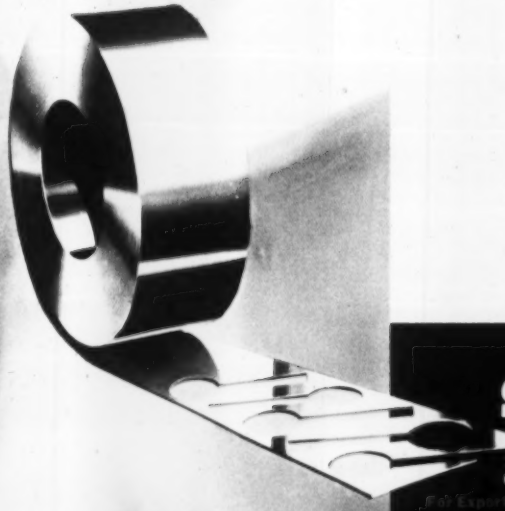

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# HERE'S HOW: The Production Manager can Increase the Profit Margin!

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Such testing is a new tool that offers immediate savings and future savings as well.

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"zero," he is actually mating the cylinder to the bore within plus or minus 20 millionths clearance.

## Programmed Progress

At a time when capital goods makers might be expected to retrench, Brown & Sharpe continues to push forward. In the last two years, the company has brought out nearly 700 different products.

What's behind the brisk pace? Henry Sharpe Jr., president, says a year ago he and his management team prescribed growth goals for five and ten year periods. "We made them ambitious. We may or may not reach them." But he feels that striving for the goals will help make the company dynamic in an industry where that's difficult.

**Geared for Production**—The company, celebrating its 125th anniversary this spring, is in the middle of a multimillion re-equipment program begun in 1954. Machine tool production lines have been overhauled; the foundry has been realigned for more efficient work flow and processing; and many other departments have updated.

The line for building automatic screw machines is set up for mass production—conveyorized assembly—a rarity in the highly specialized capital equipment business. The stockroom and shipping department are conveyorized (photo, Page 148).

**Breakdown**—To trim up operating and merchandising, B&S management has broken the company into three product divisions: Machine tools, industrial products (like cutting tools and gages), and hydraulic products. In addition to its new products, the company has added the lines of Norelco Tool Co., Manchester, Conn., (carbide cutting tools); Double A Products Co., Manchester, Mich., (industrial hydraulic control valves); the power unit portion of the Rosaen Co., Hazel Park, Mich., and hydraulic pumps and fluid motors of Gerotor-May Co., Baltimore.

Those efforts are aimed at what B&S executives feel is an assured boom. Mr. Sharpe told STEEL that if their prognostications are right, they'll sell more machine tools in the next ten years than they have in the last 25.



# Show To Boost Sales

**Machine tool distributor will call customers in to look at 60 different machines and accessory equipment. The goal: Sell every one that's on the show floor**

HOW CAN a machine tool distributor battle the recession? One answer: Hold his own machine tool show.

That's what management at Motch & Merryweather Machinery Co., Cleveland, is doing. The company is a sales outlet for 18 machine tool builders. All will have machines (more than $800,000 worth) at the show.

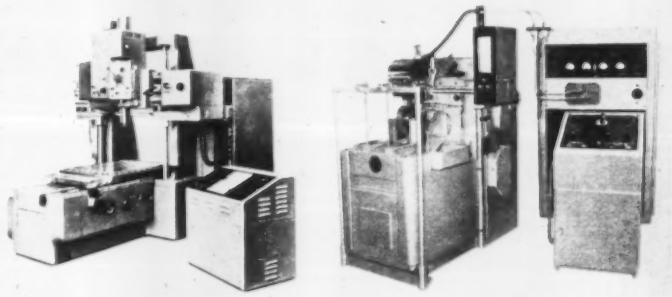
In addition, 14 makers of other equipment like machine tool accessories, inspection equipment, and cutting tools (also represented by M&M) will exhibit.

**Premiers** — Scheduled for the week of June 3, the show is timed to coincide with announcement of an array of new builder products. Included are: A Sip jig borer with automatic positioning, an Avey Hydroway unit, Bickford's 39-in. upright drill, Danly OBI presses, a 42-in. G&L vertical turret lathe, Gorton pantographs and vertical mills with hydraulic duplicating, Gould & Eberhardt induction gear hardening machine, M&M's vertical turner, and Norton universal and 6-in. surface grinders.

**Purpose** — Clare Kubik, M&M vice president, says the show will run the full week so each visitor has a chance to discuss his production problems with company representatives and engineers. With sales offices in Pittsburgh, Detroit, and Cincinnati, the company hopes to draw guests from a large part of the Midwest.

"But," Mr. Kubik says, "there's no doubt about the immediate purpose of the show. Although we intend to get better acquainted with many of our customers and get them thinking about machines we offer, this is a selling venture. We hope to sell every machine on the floor.

"That's an ambitious goal, but by attaining it, we will boost our 1958 business substantially. What's more, the long term benefits of a show, through customer acquaintance are guaranteed."



**Here are two of the new machines to be exhibited at the M&M show. At left is a Sip jig borer that incorporates a co-ordinate repeating system. The operator manually runs through the machining cycle on the first part of a group. With the controls on the console, he puts the position information on a magnetic drum. Positioning for the rest of the parts in the lot is taken from the drum automatically. At right is Gould & Eberhardt's gear tooth induction hardener with control precise enough to vary the case depth from tooth tip to root, or to provide a uniform case. The complete hardening process is carried out under water**

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Entrance to Cleveland Plant

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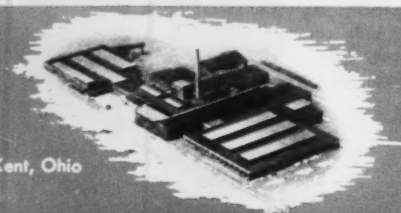
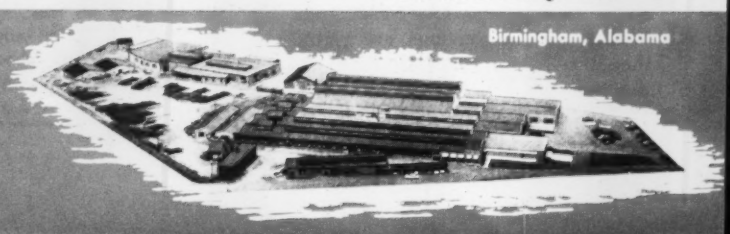
Entrance to Chicago Plant



Kent, Ohio



Birmingham, Alabama

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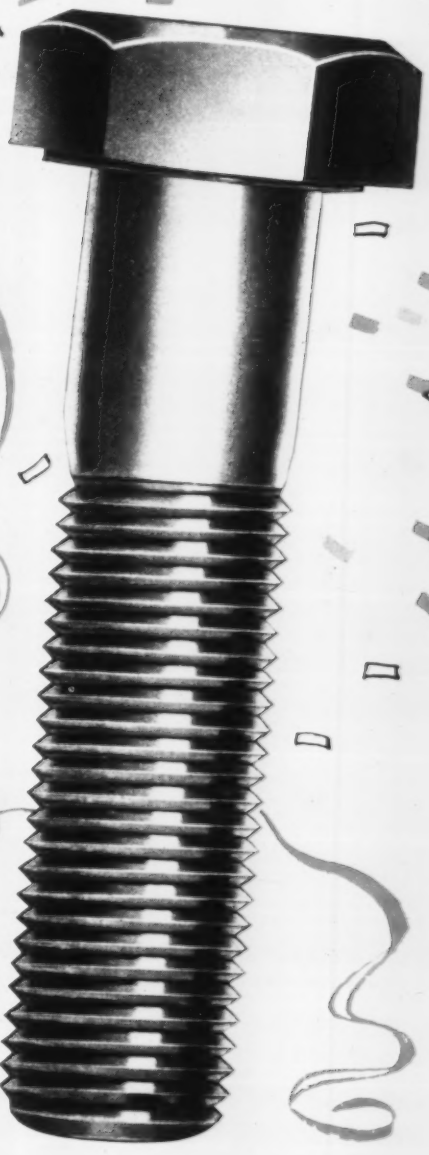

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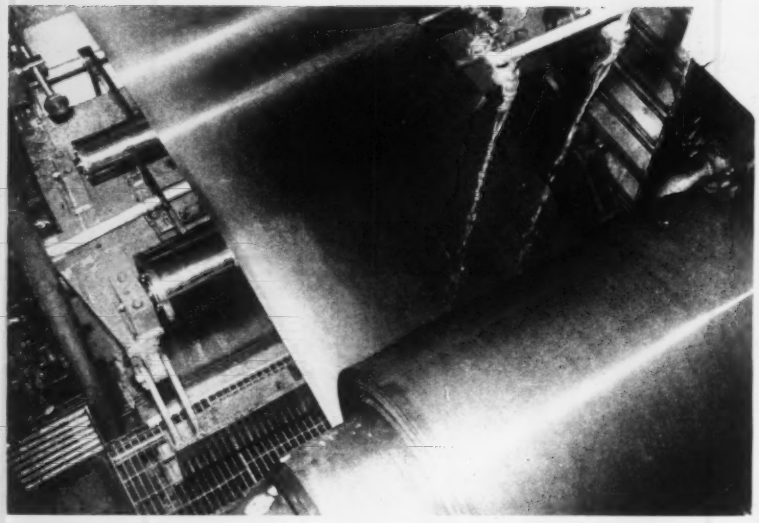


*Money flowing away—reason enough for . . .*

# Reclaiming Rolling Fluids

**Instead of discarding or burning used rolling oil-solvent mixtures, Kaiser finds it pays to recover and re-use them in its aluminum rolling mills at Trentwood, Wash.**

THE FOUR cold rolling mills at the Trentwood, Wash., plant of Kaiser Aluminum & Chemical Corp. use about 30,000 gallons of a mixture of Stoddard solvent and absorption oil coolant per month. With solvent costing about 20 cents a gallon and coolant about 34 cents, Kaiser engineers felt that reclamation would be worthwhile.

In 1950 they constructed a solvent-coolant recovery plant. It cost about $14,000 and hasn't required modification since. During the intervening years, it has paid for itself several times over.

**Operation** — Used coolant runs from the mills into a sump. From there it is pumped to a central sump and eventually into a holding tank in the oilhouse.

The recovery plant operator draws off 1000-gallon batches for heating and filtering. The filtrate is fed to a still and fractionating column. Solid particles must be filtered out to prevent foaming in the still.

The still operates at about 350° F (bottom temperature), with steam coils supplying the heat. Bottom pressure in the still is held at 10 mm of mercury and that in the solvent condenser at 5 mm.

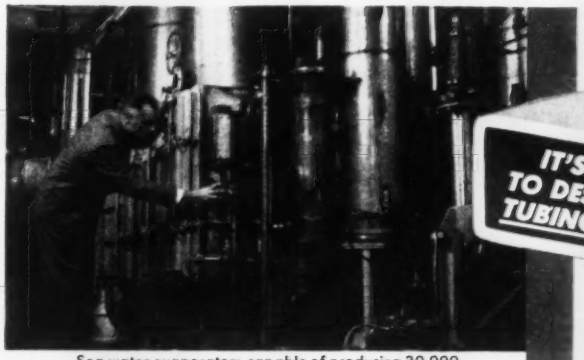
**Separation** — A rotary pump transfers condensed solvent into a water-solvent separator. This is a 50-gallon tank with a porous carbon tube in the center. Solvent will flow through the tube, but water will not. After flowing through fuller's earth for purification, the solvent enters a storage tank from which it is pumped back to the mills.

About half the solvent sprayed on the aluminum sheet in the mill is recovered for re-use. The other half remains on the sheet or is vaporized in the mill.

About 99 per cent of the coolant oil that reaches the still is recovered. From the still it is pumped by rotary vacuum pump through a cooler into a surge tank. From there it flows to holding tanks for use in the mills.

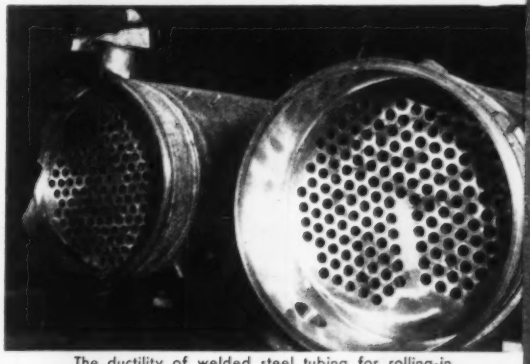
As the illustration below shows, the plant is a compact unit taking up little floor space. Only one operator is required.

**Solvent-coolant recovery unit at the Trentwood, Wash., mill of Kaiser Aluminum & Chemical Corp. Left to right: Reclaimed solvent and coolant storage tanks, filter press with still and fractionating tower in the background, incoming oil storage tank and oil additive blending tank**

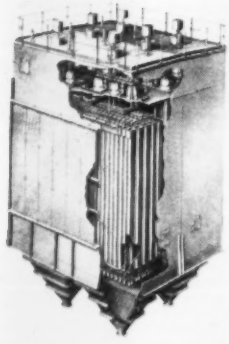


Sea water evaporators capable of producing 30,000 gallons of fresh water daily depend on welded stainless steel tubing for corrosion resistance.

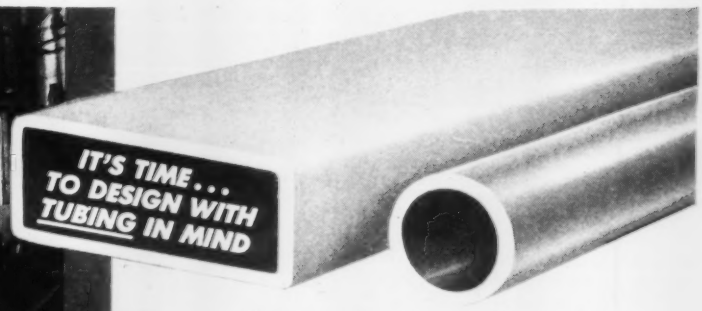
The casings and plugs in this sodium reactor core are welded stainless steel tubing to insure corrosion resistance and uniform fit.



The ductility of welded steel tubing for rolling-in, plus reliable corrosion resistance and durability are added advantages in this heat exchanger.



This industrial plate-type precipitator utilizes deformed rectangular tubing for light weight in service—economy of electrode fabrication.

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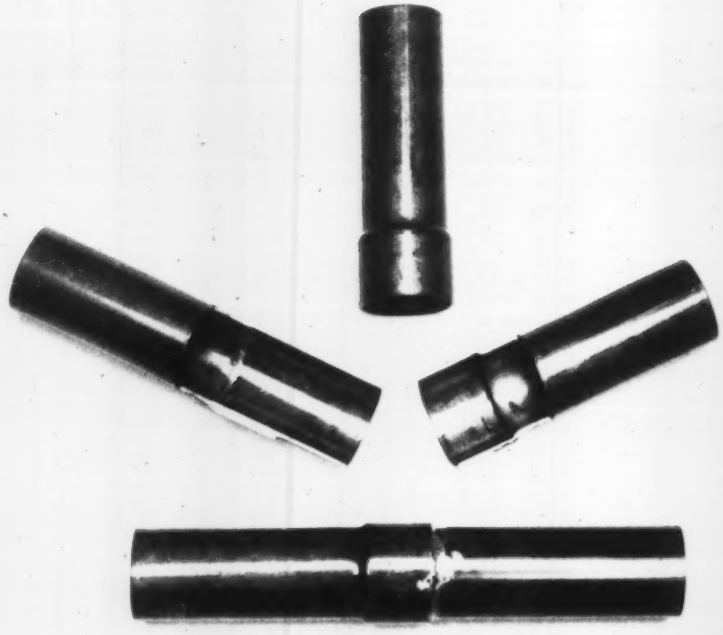
LC-582

Capillary flow of the solder makes it unnecessary to apply torch or filler metal to the entire joint periphery



Cutaway view shows the smooth joint provided by the end cup after brazing

# Light Piping Saves Dollars

**Ford is using it in a paint distribution system. The product features low first cost, brazed (or soldered) joints, and several significant operating advantages**

IF YOU are building a piping system and internal corrosion is not a big problem, lightweight tubing can save you money, plus giving you an efficient system.

In most sizes, the tubes cost substantially less than black pipe; installation savings stem from brazed or soldered joints rather than threaded connections and inexpensive supporting hangers.

**Piping Paint**—The first major installation of such a system is at the Lincoln Assembly Plant, a division of Ford Motor Co., Wixom, Mich. Over 25 miles of piping make up the paint distribution system. It has several operating advantages:

- Viscous paint flows smoothly.
- Joints do not leak.
- It's easy to clean.
- Pressure drop is minimal.
- Maintenance costs are low.

The tubing is made by Standard Tube Co., Detroit. An expanded end cup, formed to close tolerance on the inside diameter, closely matches with the outside diameter, to permit leakproof brazing and soldering.

**Making a Joint**—Surfaces are first wiped with a fluxing agent. It is sometimes necessary to clean the ends to be joined so foreign matter does not prevent proper wetting action.

A small portion of the expanded end tubing or fitting is heated with a torch. When temperature has been reached, the soldering or brazing wire is applied at the junction and flows by capillary action to form a positive seal.

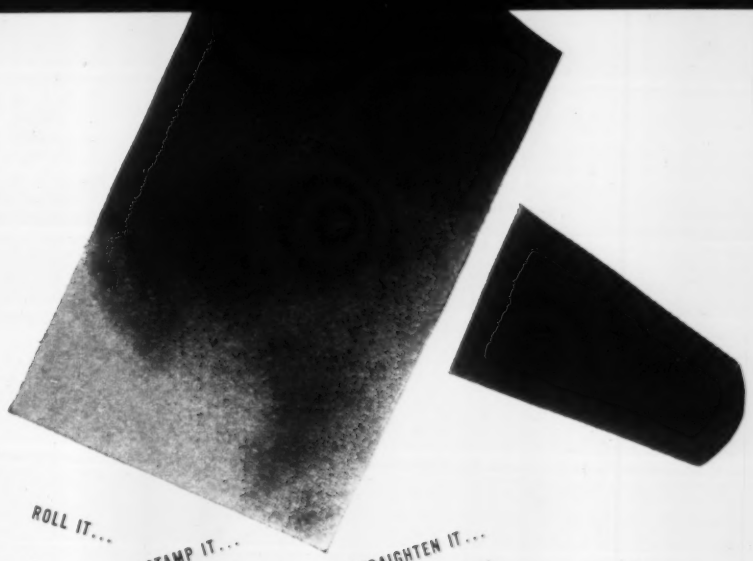
Such joining produces a smooth inside surface, making the line easy to clean. Flushing with solvents is usually enough.

**Easy Installation**—Since only a small portion of a circumference is heated, close work can be done.

The tubing lends itself to bending. A simple power bender was used for the Lincoln installation. Sharp radius elbows with expanded ends or malleable iron fittings can also be used for corners.

Adapters or reducers made of malleable iron or formed tubing are available. They permit the use of both threaded and brazed or soldered piping in the same system.

# HOW DO YOU PUT THE VALUE IN METAL?



ROLL IT...
STAMP IT...
STRAIGHTEN IT...
SHEAR IT...
FORGE IT...
DRAW IT...
PUNCH IT...
COIL IT...
LEVEL IT...
FLANGE IT...
TEMPER IT...
PICKLE IT...
GALVANIZE IT...
EDGE IT...
SLIT IT...
TURN IT...
EXTRUDE IT...
EVEN DUMP IT...

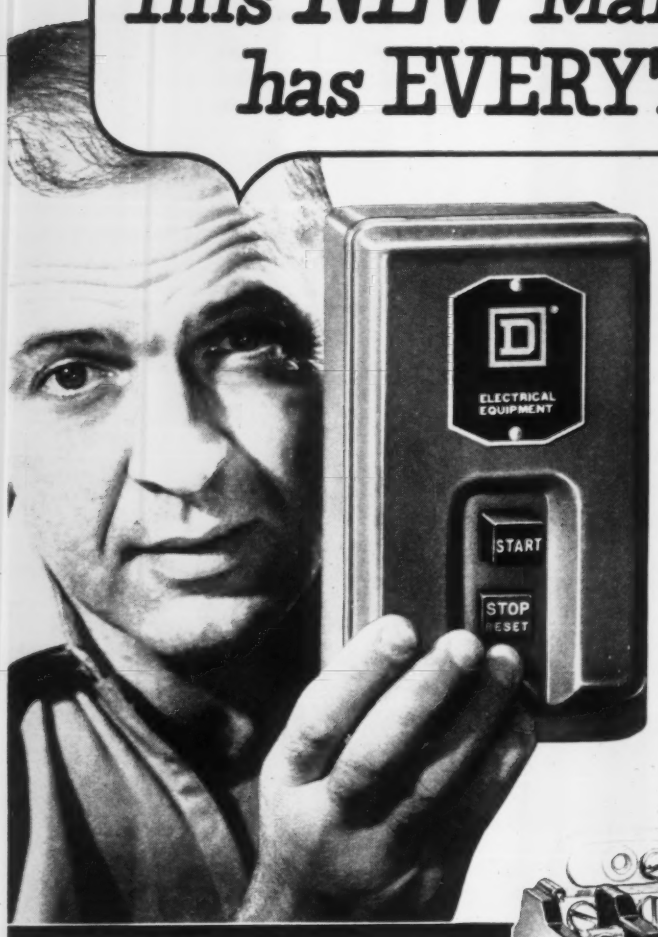
## THERE'S A BLISS MACHINE THAT WILL DO THE JOB!

BLISS
SINCE 1857 ®

*100 Years of Making Metal Work for Mankind*

E. W. BLISS COMPANY General Offices: Canton, Ohio

# This NEW Manual Starter has EVERYTHING!




## NEMA Sizes 0 and 1

**Two, three and four-pole construction**

***SMALLER!*** Takes less space, whether it's built into machine or mounted externally

***SMART STYLING!*** Matches the streamlined appearance of today's modern machines

***QWIK-MAKE, QWIK-BREAK!*** Positive snap-action opening and closing of contacts. Longer contact life

***TRIP-FREE OVERLOAD PROTECTION!*** Impossible for operator to hold motor circuit closed against overload

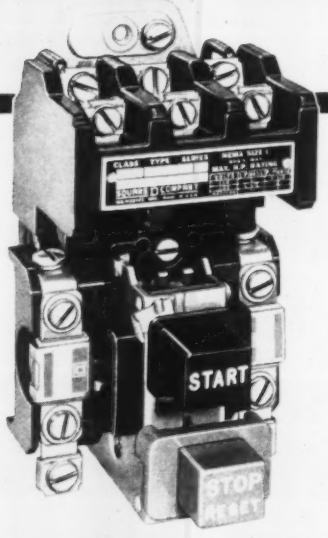
***LONGER LIFE!*** *Toggle Action* operating mechanism. Heavy-duty construction throughout

***EASIER INSTALLATION!*** Wire it without removing starter from enclosure. All terminals have pressure wire connectors

***EASIER MAINTENANCE!***
"Off-the-Shelf" parts kits make normal maintenance and modifications easier than ever. They're easy to buy, easy to identify, and faster to install

***TAMPER-PROOF!***
Cover padlocking device prevents tampering by unauthorized personnel. Safety latch locks "start" button in "OFF" position

***VISIBLE INDICATION OF OVERLOAD!***
Self-centering push-buttons show when overload has occurred

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Water and Dust-Tight
Hazardous Locations
Flush Mounting

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*Address Square D Company,*
*4041 North Richards Street,*
*Milwaukee 12,*
*Wisconsin*

**EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE**

**SQUARE D COMPANY**

# Makes Better Weld

**Inserts assure high quality of one-side closure in a heavy atomic reactor vessel**

CONSUMABLE inserts, developed originally for buttwelding pipe, greatly improve the welding of hemispheres which form a nuclear reactor pressure vessel.

Such spheres are difficult to join because all welding must be done from the outside. The inside of the weld must be smooth, uniform, and free of crevices.

**Size**—Each sphere is 60 in. inside and is made of 4-in. mild steel clad with 0.4 in. of Type 347 stainless. The vessel handles highly corrosive heavy water at 2000 psi.

The builder, Newport News Shipbuilding & Drydock Co., Newport News, Va., says that an insert assures a high quality weld from one side, but joint preparation must be more careful. The firm machines a 3/16-in. radius on the inner surface, leaving a 0.050-in. land. The joint face is turned at 20 degrees for about an inch and the rest at 10 degrees.

**ENGINEER**
**. . . examines fitup for root pass**

**Welding**—After visual inspection, an Arcos EB insert is tackwelded to the 0.050-in. land on one hemisphere. The two halves are welded in a fixture.

The vessel is radiographed after the root and two passes are completed. The key to quality, says Arcos Corp., Philadelphia, is the root pass.

**Loftsman is drawing on Stabilene plastic film. Surface picks up pencil or ink. Transparency is said to be superior to that of many tracing papers. Film also resists aging**

# Firm Photographs Templates

**Full-size drawing on treated plastic makes a negative for an optical method of outlining. Accuracy is improved. Aviation firm says it has cut operations from five to three**

A PLASTIC FILM—Stabilene—is the stepsaving key to a more accurate way of making templates.

Loftsmen make full-size drawings on the film. It becomes the negative in an optical system which reproduces the pattern on a light-sensitized surface.

The ability of the film to resist high humidities and ultraviolet aging at 200° F aids tooling and layout people at the Columbus (Ohio) Div., North American Aviation Inc., in building templates within a 0.005 in. tolerance (or 0.002 in. when necessary).

The new method is faster—North American eliminated 40 per cent of its template operations.

**Method**—You can draw on the film with pencil or ink, says Keuffel & Esser Co., New York, which prepares the plastic surface. Transparency exceeds that of prepared tracing papers.

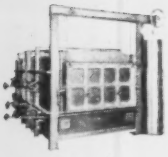
At North American, engineering information is fed through a planning desk, recorded, and put up as a work package. A full-size master layout follows on Stabilene film. Parts are shown as assemblies so that loftsmen can check engineering data and tooling holes. All necessary views are drawn on the master so area reproductions will give templatemakers enough data.

After checking, reproductions of the drawings are ordered through a central control. Operators sensitize a sheet of template metal by spraying or rolling on a light-sensitive emulsion. As soon as it's dry, master layout film and metal are exposed in a Miller-Trojan contact printer. After development, the templates are sawed and filed.

**Wrap Up**—Final checks of accuracy come after the master models are made from the templates. Toolmakers check the models in an optical tooling dock (it has transits like those surveyors use). Measurements must check to 0.001 in.

North American can complete accurate tooling for the regular production of plane parts by the time the tenth airplane has been made from handmade parts.

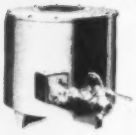
# SURFA



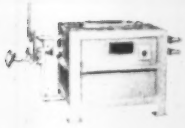
large oven

small oven

laboratory

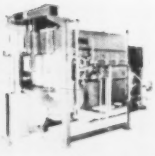


circular pot

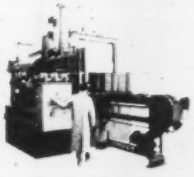


rectangular pot

forge



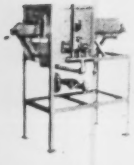
balco® atmosphere



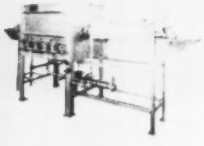
allcase® atmosphere

horizontal muffle

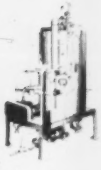
vertical muffle



brazing

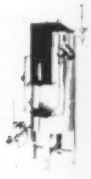


sintering



MRX® atmosphere generator

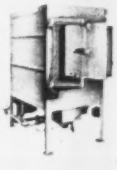
MDX® atmosphere generator



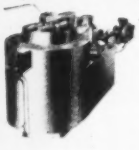
MAX® atmosphere generator

stainless steel

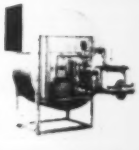
rivet heater



horizontal convection

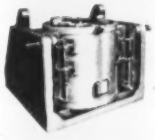


vertical convection

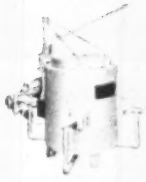


direct air heaters

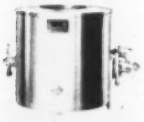
# C E



tilting metal melting

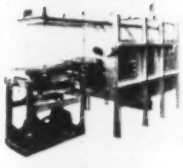


stationary metal melting

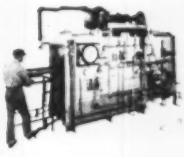


soft metal melting

aluminum melting-holding

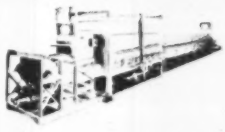


continuous snap hearth



continuous link belt

indirect air heaters



continuous brazing

## *widest selection*

The Surface line of Standard Rated equipment offers a broad range of types and sizes to choose from. Exactly what is needed can be selected. Standard furnaces can be modified to meet the demands of unusual applications.

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Rated production makes it easy to determine the quantity of finished product which a Surface unit will produce in any given period of time.

## *known operating costs*

Tabulated figures and performance curves on all units clearly indicate in advance the operating cost per pound of finished product.

## *quick delivery*

Surface standardization permits stocking the same parts for many different furnaces. This cuts engineering and procurement time. Surface also offers 80 types and 800 sizes of industrial burners—the same as used on Standard Rated furnaces—for application to your existing furnaces or other requirements.

*Write for Bulletin SC-175.*

Surface Combustion Corporation, 2385 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario.

Surface

*wherever heat is used in industry*

Slip cast high-temperature parts made by Haynes Stellite Co.

# Powder Parts Made Without a Press

**Slip casting, a technique of the ceramic industry, is being used in applications that can't be handled by pressing. Example: Fabricating refractory metals**

AN OLD TECHNIQUE of the ceramic industry — slip casting — is broadening the horizons of powder metallurgy.

It can be used to make hollow parts, parts with re-entrant angles, and parts too big for powder pressing.

Look for the biggest advances to be made with cermets and refractory metals that are difficult or impossible to fabricate by other techniques. Examples: Rocket burner sections, nose cones, and turbine buckets.

**To Cast Slip**—The basic idea is startlingly simple. A slurry (or slip) of metal powder, water, and an agent to keep the powder from clumping is poured into a plaster of paris mold. The mold absorbs most of the water.

When the mold is broken away, the semidry part inside has enough green strength to survive careful handling. After sintering, the part has the strength and density of a pressed powder part.

**Complement** — Slip casting isn't going to replace pressing; it takes over where pressing leaves off. It uses no expensive presses or dies, and the plaster molds are cheap to make. Compared with powder pressing, the process is slow, but it is ideally suited to short runs for which pressing is prohibitively expensive.

Slip casting requires ultrafine powders; pressing powders are coarse by comparison. Because the grains are not deformed as in pressing, there are differences in the physical properties of slip cast and pressed parts. One is the greater resistance of slip cast parts to heat shock.

Slip cast parts can be pretty large. How big is an unanswered question, but to give you an idea, the ceramic industry uses the method to make toilet bowls.

**Composition** — The solid ingredients of the slip are metals or ce-

## Slip Cast Parts Compare Favorably

**Physical properties of a part made of 302-B stainless steel by four different techniques:**

| Processing Method | Density lb per cu in. | Ultimate Tensile Strength psi | Elongation % |
|---|---|---|---|
| **Slip casting,** sintered at 2400° F for 8 hr | 0.238 | 70,500 | 20 |
| **Powder metallurgy A,** compacted at 50 tons per sq in. and sintered at 2250° F for 3 hr | 0.235 | 54,500 | 18 |
| **Powder metallurgy B,** compacted and coined at 50 tons per sq in., sintered and resintered at 2250° F for 3 hr | 0.245 | 87,500 | 33 |
| **Wrought** | 0.289 | 80,000 | 40 |

Source: H. H. Hausner, consulting engineer, New York.

ramics ground to about −325 mesh. Stainless steel, silicon nitride, molybdenum, tungsten, chromium, aluminum oxide, and molybdenum disilicide are some of the refractory materials which have been used. Perhaps 15 per cent of the solid materials will be larger: −100 + 150 mesh.

The rest of the slip (about 15 per cent by weight) is distilled water to which is added a fraction of 1 per cent of a deflocculating agent and binder such as ammonium alginate. It helps to keep the solid particles in suspension, although most of them are small enough to not be affected by gravity.

The acidity or alkalinity of the slip will largely determine the density of the final product, so it may be necessary to adjust the pH.

**Casting** — There's nothing unusual about the plaster. Several commercial ones designed for the process are available. The mold face is coated with soap solution before casting to act as a mold release agent.

The slip is poured into the mold and left until it takes a set. The time will vary with the part, but 48 hours is not unusual. Shaking or whirling the mold, or placing it under vacuum helps to assure that all the bubbles escape.

It's easy to make hollow castings. After the moisture has been sucked from the outer layers of slip, the rest is simply poured out of the mold.

**Sintering**—This is done exactly as with a pressed powder compact. But it may be necessary to air dry the part after taking it from the mold—before sintering.

Since slip cast parts start out about 85 per cent solid and the rest moisture, up to 20 per cent shrinkage is to be expected on drying and sintering. Fortunately, shrinkage is uniform in any one plane. This makes it possible to design molds to compensate for it.

## An Inspection Tip

**You can "look" where you can't "see" with the boroscope, an instrument used by doctors**

HERE'S AN IDEA for the inspection of "inaccessible" areas: The interiors of sealed airplane wings are being examined by a device used by physicians to view the stomach and lungs of patients. It is small enough to pass through a bolt hole.

**Special Job**—A modified version of the medical instrument is being used by Convair Div., General Dynamics Corp., Ft. Worth, Tex. For its requirements, standard types were too short, too fat, and didn't provide enough light. It is using experimental instruments supplied by American Cystoscope Makers Inc., New York, and Plummer & Kershaw, Philadelphia.

A built-in light source presented a problem: Because the wings double as fuel tanks, Convair wanted to eliminate the possibility of sparks caused by a broken bulb.

Plummer & Kershaw came up with a solution: Use reflected light from an external bulb (50 watts). Condensing lenses focus the light to the end of a quartz rod. A prism directs it to where it is needed.

Convair also had developed a technique for taking photographs and a spray attachment—dye is used to differentiate a scratch from a crack. It is working on a flexible stop drill which will be used to minimize crack growth.

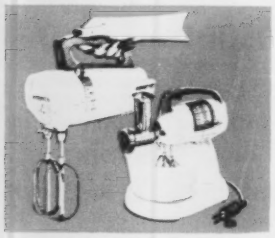
## New T-1 Guarantees

The new guaranteed strength minimums for T-1 steel mean cost savings of 10 per cent, say U. S. Steel spokesmen.

The higher yield and tensile strength minimums permit cutting the size of parts, saving shipping and fabricating costs.

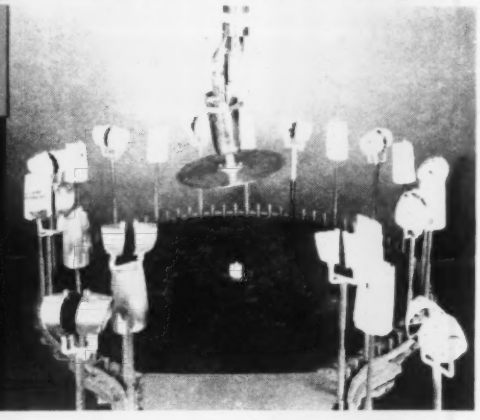
**Changes** — Minimum yield strength is 100,000 psi, vs. 90,000 psi of the previous specification. Tensile strength minimums were upped from 105,000 to 115,000 psi. Tensile maximum is 135,000 psi.

Tests at the Homestead Works confirmed the data. T-1 has three times the yield strength and four times the atmospheric corrosion resistance of structural carbon steel, the corporation reports.



**DORMEYER MIXERS**
**are painted with**
**RANSBURG**
**NO. 2 PROCESS**

. . . and high quality standards
are easily maintained with Electrostatic Spray Painting



**Aluminum and zinc die castings of the Dormeyer Mixers are painted uniformly as the parts make a loop around the RANSBURG disk in the job painting plant of Enameled Steel & Sign Co.**

Enameled Steel & Sign Co. is able to serve many customers like Dormeyer, for their Chicago job painting plant is equipped with modern and efficient finishing facilities for producing high quality, high volume painting.

Electrostatic spray painting has practically replaced all other methods here, for the flexibility and near 100% efficiency of the Ransburg No. 2 Process enables Enameled Steel to serve many manufacturers of a wide variety of products. And, this with a comparatively small labor crew!

Today—with Ransburg No. 2 Process—Enameled Steel is realizing more than 60% paint savings over former hand spray. Rejects have been cut to less than 1%, for the Ransburg No. 2 Process applies a uniform, high quality finish never before obtainable with old-fashioned painting methods.

THINK OF WHAT 60% PAINT SAVINGS WOULD MEAN IN YOUR OWN FINISHING DEPARTMENT

Whatever you manufacture, if your production justifies conveyorized painting, you should look into the savings and improved quality which can be yours with Ransburg Electro-Spray. Let us tell you about the complete Ransburg services, including the test painting of your products in our laboratories.

*Ransburg* **ELECTRO-COATING CORP.**
**Indianapolis 7, Indiana**

RANSBURG


# Turbine Tractor

**Researchers are trying out the gas turbine as a replacement for gas and diesel engines**

TOMORROW'S tractors, pony engines, even lift trucks, may be running on gas turbine power if an experimental tractor works out for Allis-Chalmers Mfg. Co., Milwaukee.

The machine is a conventional tractor (P-91) with a Boeing aircraft gas turbine in place of the conventional diesel engine. It's part of A-C's research into heat engines as power sources for vehicles. Results so far indicate "interesting possibilities."

**GAS TURBINE**
**. . . powers experimental tractor**

**Construction**—The gas turbine is the equivalent of a built-in torque converter, standard equipment on A-C's Model HD-21 tractor. One of the problems being checked is the turbine's ability to deliver a wide range of speeds with adequate flexibility of power.

Net horsepower is said to be about equal to that of its diesel counterpart. External appearance is about the same.

Exhaust gases are handled differently to avoid inconveniencing the operator. Noise level is equal to a diesel's exhaust, but pitch and tone character are different.

**Fuels**—Gas turbines can be run on cheap fuels like kerosine, vegetable, and waste oils. Its key to economy, many engineers say, is a constant high speed power demand.

One of the problems facing A-C engineers is economy at low speed.

## Motors Designed for Adverse Operating Conditions

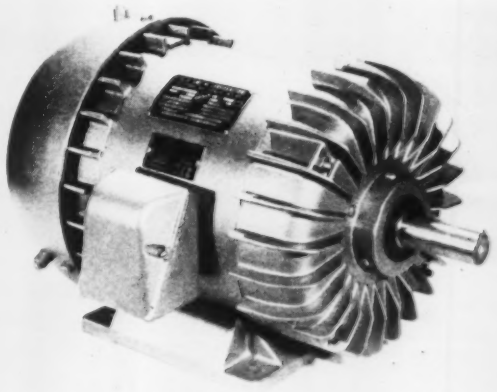
Totally enclosed and explosion-proof motors from 1 to 500 hp are available in new NEMA frames through No. 365U, old NEMA frames through No. 505, and standard industrial frames above No. 505.

The motors have recessed Neoprene slingers on output shafts, stainless steel connection plates, shock resistant fan covers, indexed leads, and balanced insulation systems impervious to moisture and corrosive atmospheres.

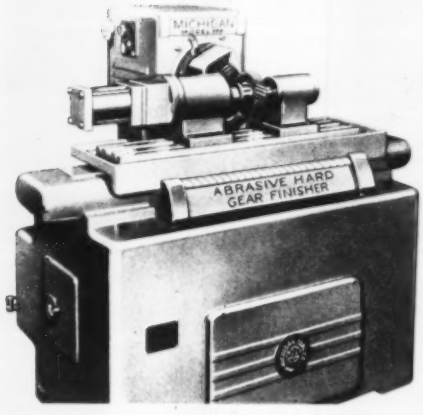
Overside conduit boxes are standard to assure easy installation.

Design of each rating has been tested to insure more than adequate heat dissipation from all motor elements.

The motors are designed to handle the most adverse operating conditions in industrial applications. *Write*: Electric Motor Div., A. O. Smith Corp., Tipp City, Ohio.



## Gear Finishing Machine Salvages Noisy Gears




Using abrasive throwaway tools, this gear finishing machine can economically finish small and medium size hardened gears to quiet operating smoothness.

Quietness is obtained without pairing of gears, and the unit enables salvaging of those pieces too noisy to meet requirements.

The finishing tool is a rotary, precision tool of plastic abrasive of 80 grit (average), and is supplied in a $9\frac{1}{4}$ in. diameter and 1 or $1\frac{1}{2}$ in. face widths.

Model 999 is an application of throwaway tooling to the crossed-axis finishing of hardened gear teeth. The machine may be used for high or low production (average cycle time is about 1 minute). It is adaptable to manual, semiautomatic, or fully automatic loading. *Write*: Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

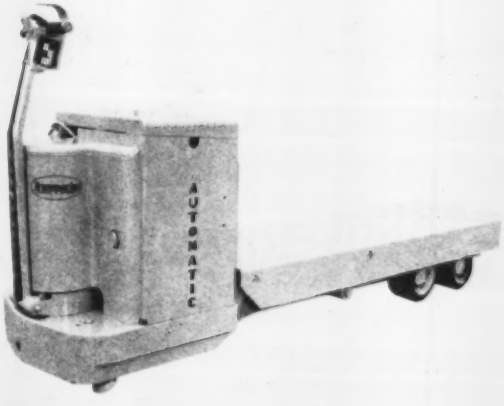
## Heavy-Duty Trucks Have Up to 15,000 lb Lifting Capacity

Heavy-duty platform trucks reduce handling costs in the moving of unit loads.

They are low lift, operator led trucks. Called Transporters, they handle from 8000 to 15,000 lb. Models are designated WWY-8, 10, 12, and 15, the figures indicating capacity in thousands of pounds.

Steel wheels are standard, but rubber ones are available in tandem or in line on the same axis. Because of the necessity for adequate load wheels, trucks are offered only in 9 and 11 in. lowered heights. Standard lift is $3\frac{1}{2}$ in.—higher lift will be supplied on special order. Short types are available for maneuverability.

Standard platforms are 27 in. wide and from 36 to 144 in. long. *Write*: Automatic Transportation Co., division of Yale & Towne Mfg. Co., 149 W. 87th St., Chicago 20, Ill. *Phone*: Radcliffe 3-7000

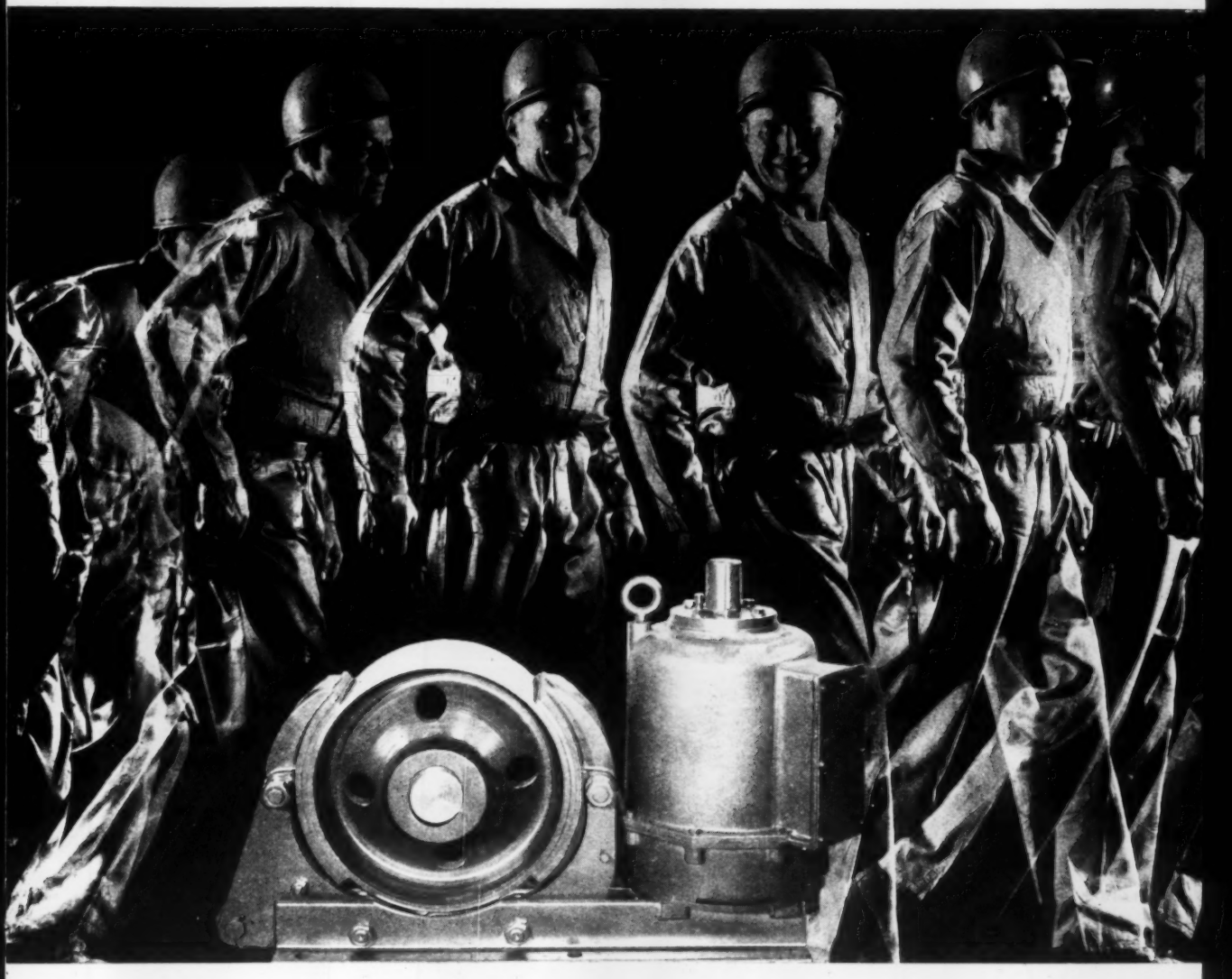


# Here's why you save $60 in maintenance

## Ordinary brakes need frequent adjustment . . .

Ordinary magnetic brakes require periodic adjustment to compensate for wear . . . industry average is once every two weeks. New Westinghouse SA brakes are completely self-adjusting . . . automatically adjust themselves *during* operation. Once they're installed, you never have to touch them. This means you save at least $60 per year per brake *in maintenance alone.* And that's not all . . .

# a year with every Westinghouse SA brake



## Westinghouse SA brakes adjust themselves . . . automatically

Westinghouse magnetic brakes also offer you these important benefits: 1) dust-tight enclosure which eliminates cleaning of dust, dirt and metal particles . . . 2) automatic self-alignment which substantially reduces installation time . . . 3) safe, sure protection against dragging shoe tips and uneven lining wear, eliminating costly replacements.

Ask your Westinghouse representative about the many ways this new brake can benefit you. Or, write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa. Ask for Booklet B-6548.

J-22114

YOU CAN BE SURE...IF IT'S

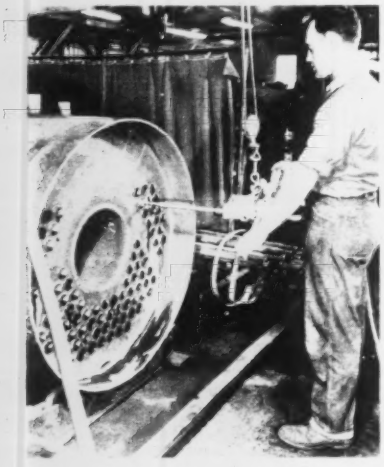
Westinghouse

## NEW PRODUCTS and equipment

### Boiler Tubes Expanded

An automatic tube expander for manufacturers of package type, fire tube boilers makes production more efficient and cuts user maintenance costs.

The air driven, automatically controlled tool eliminates the variables caused by overrolling or underrolling, thus assuring uniform distribution of expansion stresses throughout tube sheet when a boiler is in operation.

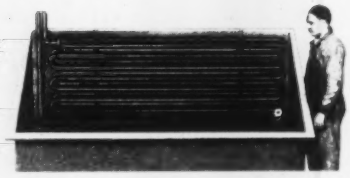


An example of this equipment is shown working on a Powermaster package automatic boiler at Orr & Sembower, Reading, Pa. The calibrated dial has been set at the desired tightness and when that point is reached, the Torq-Air-Matic control will stop the rotating. *Write*: Thomas C. Wilson Inc., Long Island City, N. Y. *Phone*: Ravenswood 9-3360

### Tank Heater

The Hi-Therm Grid line of heaters offers high speed, efficient heating of plating tank and caustic tank solutions. These heaters feature a maximum amount of prime heat transfer surface in a limited space. The cross-sectional width is only $2\frac{3}{4}$ in. High concentration of heating surface promotes agitation within the solution being heated. The staggered arrangement of the tubes produces a high conduction and convection factor which accelerates fluid motion.

The unit can be used on the side



or bottom of a tank with horizontal or vertical supply and return. Standard height is $31\frac{1}{2}$ in., length to requirement. It is fabricated from full weight, bending quality, wrought steel pipe and tested to 350 psi. *Write*: Rempe Co., 340 N. Sacramento Blvd., Chicago 12, Ill. *Phone*: Kedzie 3-0483

### Wash Has 100% Coverage

A washer for parts that roll is designed in high level sizes for horizontal installation in line with overhead distribution systems of automated production lines.

The unit eliminates elevating of parts from floor level.

Part handling is integrated through both a spray wash and an air blow-off stage. Coverage is 100 per cent during both the washing and drying sequences. The unit is fully automatic and operates at high speed. Cycle time at full capacity is about 8 seconds. Double track washers handle about 950 parts an hour.

Although custommade, the washer is assembled from standard components to make it readily adaptable to a wide range of work. A conveyor chain is driven by a $\frac{1}{2}$-hp motor through a cone-drive gear reducer. *Write*: Gear-O-Mation Div., Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

### Resins Metal Filled

A group of metal filled epoxy resins, designated as Stabond EP Series, is a two-component, room temperature curing system for making strong castings with properties similar to metal ones.

It forms molds for short run use; plugs holes in metal, wood, and plastic structures; and has excellent machining properties.

EP-104 has been especially designed for filling honeycomb structures for insertion of bolts and hangers. *Write*: American Latex Products Corp., 3341 W. El Segundo Blvd., Hawthorne, Calif. *Phone*: Osborn 6-0141

### Cleans Ferrous Metals

Magnus 61-DRX for the removal of light films of oil, shop dirt, paint, and rust deposits from ferrous metal parts is a granular mixture of strong alkalies containing a corrosion solubilizing compound and a wetting agent.

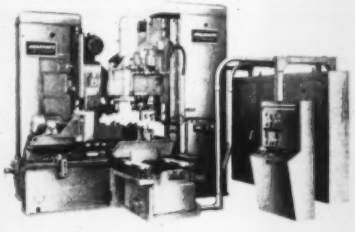
It is normally used at concentrations of $\frac{1}{2}$ to 3 lb in a gallon of water heated to 200 to 210 F. The material releases no corrosive fumes. *Write*: Magnus Chemical Co. Inc., South Avenue, Garwood, N. J. *Phone*: Sunset 9-0200

### Large Machine Versatile

An Economatic automatically controlled machine combines the advantages of multiple operations in automatic in-line sequence with the ability to switch rapidly from one workpiece to another of different shape. Illustrated is one in operation in a road building equipment plant.

The machine is programmed for producing any one of six to eight different parts. The sequence of six to eight operations on the parts is controlled simply by turning a selector switch to the correct position.

Use of building-block components increases the flexibility of the machine's use, and it can be converted readily to the production of other parts. Work holding fixtures and tools in the heads can be changed, dog adjustment ranges can be al-



# NEW REFERENCE MANUAL

## ... to help you choose dependable high-speed gear units

Here is one of the handiest manuals on high-speed gear units ever offered. It covers both speed-increasing and speed-reducing units.

Every one of its 28 pages is designed to help you in the efficient selection and application of Farrel SI units. Concise yet complete, the booklet makes it easy for you to choose the proper unit for long service life and trouble-free operation. Diagrams illustrate twelve alternative lubrication systems designed to meet individual requirements.

For your free copy, just fill out the coupon and mail it today.

**FARREL-BIRMINGHAM COMPANY, INC.**
ANSONIA, CONNECTICUT

*Plants:* Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

*Sales Offices:* Ansonia, Buffalo, Boston, Akron, Ann Arbor (Mich.), Chicago, Minneapolis, Fayetteville (N. C.), Los Angeles, Salt Lake City, Tulsa, Houston

*European Office:* Piazza della Republica 32, Milano, Italy

### What the booklet contains:

- Description of the units
- General specifications
- Instructions for selecting a unit
- Selection examples
- Table of ratio factors
- Service factor table
- Table of horsepower ratings
- Ordering instructions
- Dimension drawings
- Alternate lubrication systems
- Illustrations and descriptions of eight special test-stand units
- Installation photographs
- Details of other Farrel gears and gear units

*Farrel-Birmingham*®

FB-1128

*Engineers will find this factual manual useful in the selection of drives for a variety of applications. Send the coupon for your free copy.*

**FARREL-BIRMINGHAM COMPANY, INC., Ansonia, Conn.**

Please send me a copy of Bulletin 451, "FARREL HIGH-SPEED GEAR UNITS."

*Name* .....

*Company* .....

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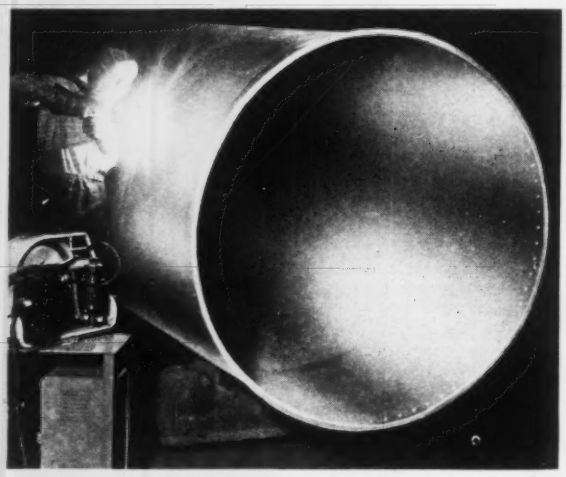
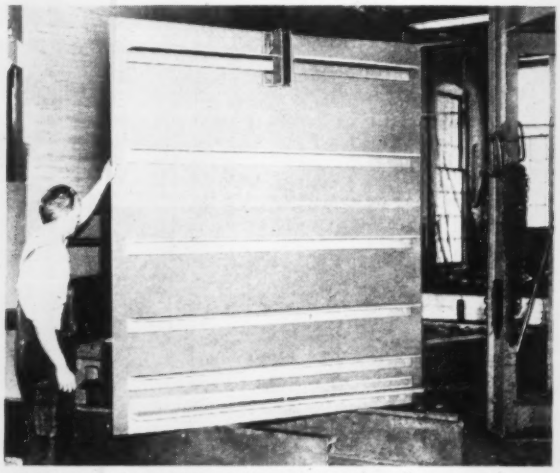
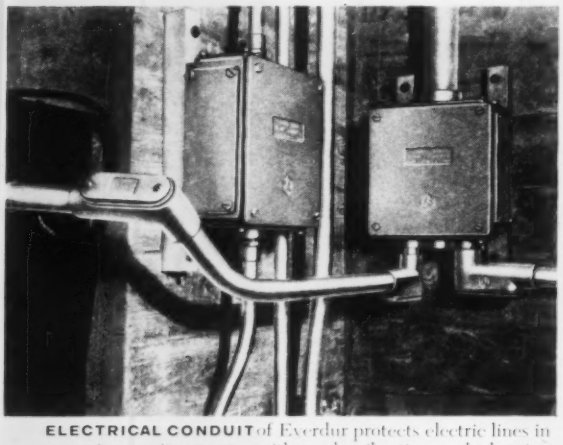
# Get unusual corrosion resistance, plus high strength, toughness, weldability, and easy fabrication with Everdur,® Anaconda copper-silicon alloys



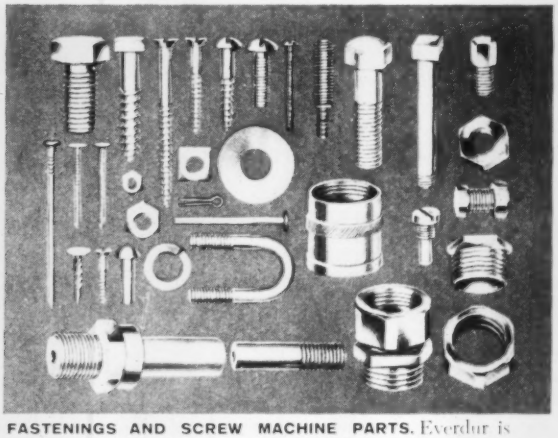
**TANKS AND INDUSTRIAL EQUIPMENT** requiring a combination of high strength, toughness and resistance to corrosion. Hot water storage heaters and tanks, unfired pressure vessels of Everdur are readily fabricated by welding.



**IN WATER AND WASTE SYSTEMS,** Everdur alloys provide easy fabrication and long service in a wide variety of jobs—from gates on to bolts and nuts. Their high strength makes possible lightweight, built-up assemblies of wrought metal.



**ELECTRICAL CONDUIT** of Everdur protects electric lines in corrosive environments, withstands vibration and abrasion—at oil refineries, in underwater tunnels (above), chemical plants. Made in two wall thicknesses—R.C. and E.M.T.



**FASTENINGS AND SCREW MACHINE PARTS.** Everdur is available in forms for hot heading and forging of bolts and accessories, severe cold-working operations for bolts and screws—and as free-cutting rod for screw machine products.

Whenever you have a tough problem calling for high strength with immunity to rust, and corrosion resistance equivalent to pure copper, consider an Everdur alloy. It may save you a lot of trouble and money. For details on properties and applications of Everdur alloys, write for Publication E-5. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

**EVERDUR**

COPPER-SILICON ALLOYS

*products of*

*Made by The American Brass Company*

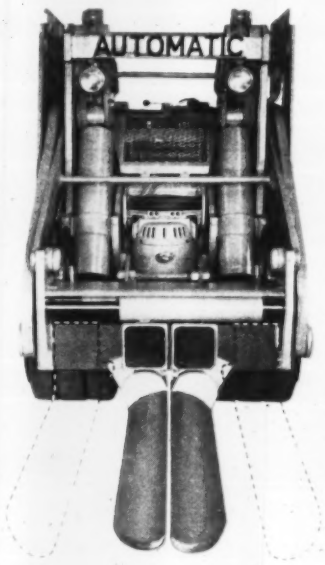
tered, and new production parts can be substituted.

If new parts are radically different, it may be necessary to rewire the selector and limit switch circuits. Workpieces for which the machine can be reprogrammed are limited only by the available volume of work space. *Write*: Buhr Machine Tool Co., Ann Arbor, Mich. *Phone*: Normandy 2-5646

## Forks Side Shift Load

A side shifting fork and load carrying arrangement is optional in the Elbolift, a heavy duty (12,000 to 20,000 lb capacity) battery-powered lift truck.

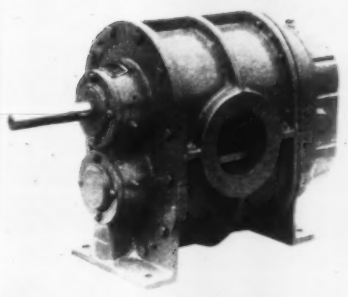
Hydraulically controlled, it enables the operator to side shift the load 4 in. to either side of truck or bring the forks together at the truck's center line to form a load carrying ram.




Special diameter rams and various lengths are available. *Write*: Automatic Transportation Co., division of Yale & Towne Mfg. Co., 149 W. 87th St., Chicago 20, Ill. Phone: Radcliffe 3-7000

## Blowers Adjust Easily

A series of positive pressure, rotary blowers for heavy industrial service is manufactured with wide face herringbone gears and an exclusive timing hub for easy field adjustment.



Timing gears hold rotating impellers in alignment, minimize lateral thrust under load, maintain impeller clearances, and eliminate head plate contact. Impeller clearances can be adjusted without removing the unit from the line, and the blower can be retimed without removing the gears.

Units are built to deliver air or gas in capacities of 10 to 1100 cfm and pressures to 10 psi. Larger units are available in capacities to 20,000 cfm at same pressures.

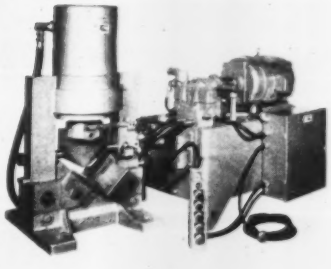
They are used for sewage disposal, water distillation, flotation, aeration, ventilation, pneumatic conveying, forced draft of combustion air, and inert gas pressurizing systems. Horizontal design is standard, but vertical can be specified. *Write*: Sutorbilt Corp., 2966 E. Victoria St., Compton, Calif. *Phone*: Ludlow 3-2226

## Shear Has Versatile Blade

A large hydraulic, angle iron shear is manufactured with semi-automatic solenoid or hand lever controls.

Start, stop, and reverse of the blade is under complete control of the operator at all times.

Capacity is 45 tons with 10 strokes a minute. With the regular angle iron shear blade, the unit will handle 6 x 6 x ½ in. angle iron, ⅝ x 6 in. flat, 1 in. square, or 1 in. round stock in mild steel, leaving the ends entirely free from distortion.

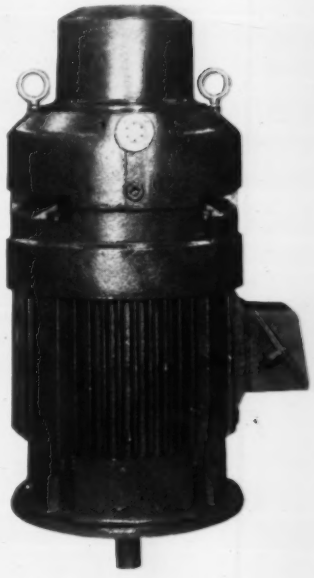


The machine will also form and bend. *Write*: W. A. Whitney Mfg. Co., 636 Race St., Rockford, Ill. *Phone*: 4-6775

## Motors for High Thrust

Vertical solid shaft, high-thrust motors in sizes from 1 to 40 hp are designed for direct mounting on high thrust pumps.

They are available in all standard enclosures: Protected; totally enclosed, fan cooled; and explosion proof. The design of the all-weather splash cover permits the stacking of additional bearings to continuously absorb high up-and-down thrust loads.



The lower guide bearing has a metering plate which automatically regulates the correct flow of lubricant to the bearing. Automatic grease relief prevents damage from grease pressure or overlubrication.

Motors are available in all standard speeds up to 3600 rpm. *Write*: Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio. *Phone*: Redwood 2-7000

## Metal Bent 180 Degrees

A line of 180-degree sheet metal brakes (portable or bench mounted) has features which permit fast free-

(*Please turn to Page* 174)

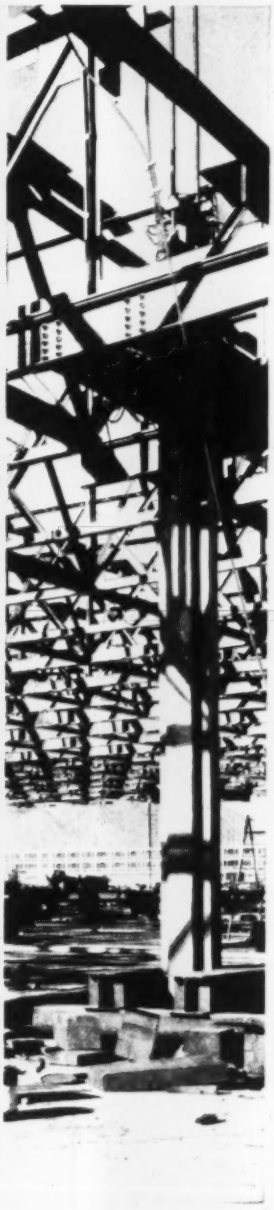
# When you buy from U. S. Steel

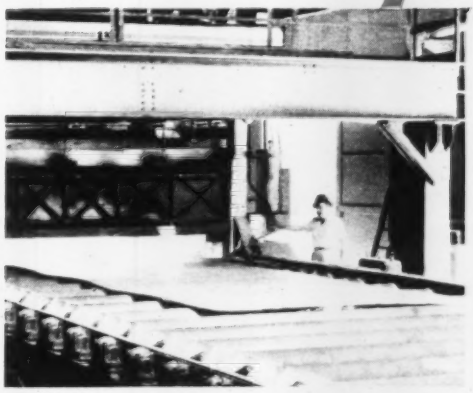
***STEEL + PLUS IN ACTION: TECHNICAL ASSISTANCE***

American Bridge Division of U. S. Steel fabricated and erected this steel truss roof for the Air Force Academy dining hall, *before* the walls were in. And what a roof! It's as big as two football fields and it weighs 1150 tons. Our construction crew welded the trusses together on the ground, set 16 columns in place, then jacked the roof up 24 feet to the top of the columns.

**American Bridge • American Steel & Wire and Cyclone Fence • Columbia-Geneva Steel • Consolidated Western Steel • National Tube • Oil Well Supply Tennessee Coal & Iron • United States Steel Homes • United States Steel Products • United States Steel Supply and Gerrard Steel Strapping United States Steel Export Company • Universal Atlas Cement Company**

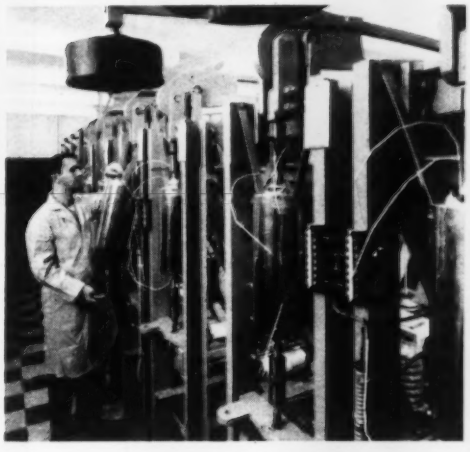
# you get STEEL + PLUS





### STEEL + PLUS IN ACTION: FACILITIES

To supply customers with the specialty products required for today's—and tomorrow's—critical applications, U. S. Steel equipped its Homestead Works with new facilities to heat-treat large plates of Stainless and USS "T-1"* Constructional Alloy Steel. These facilities have resulted in products having higher, more uniform mechanical properties and improved flatness, and have made them available in quantities to meet our customers' growing requirements for these special steels.



### STEEL + PLUS IN ACTION: RESEARCH

U. S. Steel research teams conduct "creep" and "rupture" tests to determine how long it takes metal, at very high temperatures, to distort and break under a load. This type of information is vital, not only to develop better grades of steel, but to help designers select the best materials for equipment that has to function under extreme heat.

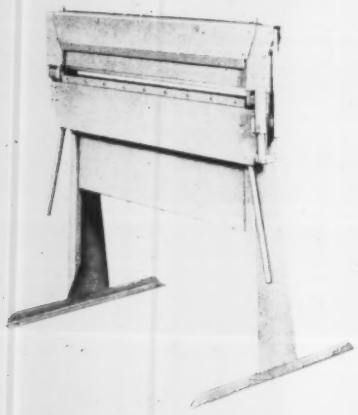
### STEEL + PLUS IN ACTION: MARKETING ASSISTANCE

The tremendous selling power of national television promotes the products made by U. S. Steel customers. Here, during a "Steel Hour" commercial, Sheila Jackson and Jack Brand tell thousands of farm owners about the advantages of factory-built steel buildings for the farm. Result: more customers for our customers.

USS United States Steel

*TRADEMARK

## NEW PRODUCTS and equipment



hand forming and bending of sheet metal parts in 20 to 16 gage, from 26 to 36 in. wide.

Brakes are available in plain, pan, and universal models. They will form 180-degree flanges in one continuous operation and can also bend complex forms.

Simple adjustments for gage and angle of bend are provided. The operator has full visibility of both sides of the machine and the work at all times. *Write*: R. E. Smith Mfg. Co., 1122 Elizabeth St., Waukegan, Ill. *Phone*: Ontario 2-4850

### Truck Controls Handy

A 24 volt, 4000 lb capacity Walkie platform truck for handling heavy skid loads has a compact power unit: It uses four 6-volt batteries, two mounted on each side of the drive unit. They are connected so that truck has three forward and reverse speeds.

In regulating speed, full battery power is utilized instead of dissipating it through resistors.

Controls for elevating, lowering, or traveling are in the handle head. A safety button in the head automatically puts the truck into reverse if the handle should touch the operator's body.

The unit comes with batteries and a separate rectifier type charger which operates from a 110-volt line. Platform lengths up to 72 in. are available in 18, 24, or 30 in. widths. *Write*: Raymond Corp., 91-164 Madison Ave., Greene, N. Y. *Phone*: 204

### Grinder for Throwaways

A machine designed to grind carbide throwaway tools will do the entire periphery of the tool in one operation, including the radius.

Sides are ground flat and parallel within 0.0002 in. The machine will

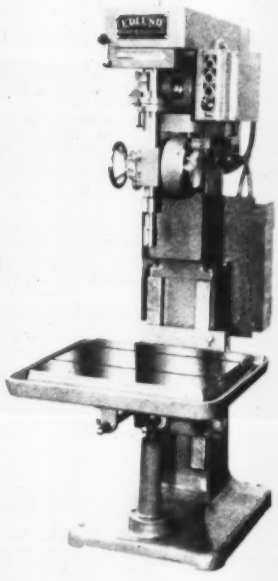
handle any shape tool. Negative and positive rake tools are ground, the machine holding 0.0005 in. tolerance on production. *Write*: Harvill Machine Co., 618 E. Ten Mile Rd., Hazel Park, Mich.

### Vertical Gun Drilling

The Model 2G vertical gun type drilling machine produces extremely straight, accurate, and smooth holes at production rates in a single operation.

Deep holes that required withdrawal of the tool can be drilled with continuous feed, and materials that work harden during machining can be drilled easily. Reaming can often be eliminated since hole finish from 4 to 8 microinches is claimed for most materials, and size can be held to close tolerance.

The machine is of the vertical spindle type and lends itself to multiple spindle operations. One gun drilling spindle can be combined with standard drilling spindles on a common base so that operations requiring one gun-drilled hole and one or more regular holes can be done at the same time.



Feed to the spindle is accomplished through a magnetic clutch which may be controlled remotely and also co-ordinated into automatic cycling operations.

Capacity of the machine is $\frac{5}{8}$ in. Holes to a depth of $7\frac{1}{2}$ in. can be drilled, depending on tool size and material. *Write*: Edlund Machinery Co., Huntington Street, Cortland, N. Y. *Phone*: Skyline 6-5661

### Treatment Etches Metal

When applied to metal surfaces, Ospho stops rust action and prepares the metal for painting (it etches the surface slightly).

Rust (iron oxide) is changed to iron phosphate. Scraping, flame cleaning, or sandblasting of metal surfaces is unnecessary. Only loose rust and scale must be removed with a wire brush before the preparation is sprayed or brushed on surfaces. *Write*: Rusticide Products Co., 3125 Perkins Ave., Cleveland 14, Ohio. *Phone*: Prospect 1-1590

### Indoor Rust Prevention

Two water soluble, thin film, polar-type rust preventatives are for use on most metals requiring long or short term indoor protection.

Preserva - Cote Concentrates 36

Plymouth "MDT" Locomotive used at Anaconda Aluminum Co., Columbia Falls, Montana

# THIS IS POWER

## ...produced for less than 13c an hour!

Like many other industrial firms, Anaconda Aluminum Company has proved again that Plymouth locomotives *designed specifically for industrial service* deliver superior performance at lower cost.

"Although its Torqomotive Drive is the feature we like best about our 40-ton Plymouth," says H. G. Satterthwaite, Manager, "certainly its operating economy is also mighty satisfying. We operate our Plymouth Diesel 40 hours a week haul everything from raw materials to finished products over 6 miles of track on approximately one gallon of fuel per hour!"

These are some of Plymouth's features users say they find superior:

***Extra reserve power*** — handling maximum loads without slip or strain.

***Easy-reach controls*** — conveniently placed for "finger-tip" operation.

***Lower per-ton-mile costs*** — through Plymouth-engineered developments.

***Less maintenance attention*** — reducing the high cost of down-time.

***Unmatched construction strength*** — giving bonus years of haulage life.

***Wide-range selection*** — Gasoline and Diesel models from 3 to 80 tons meet most industrial needs.

***Optional "Torqomotive" Drive*** — Plymouth's automatic hydraulic torque converter assuring shock-free handling, safer hauling of any load.

Let us show you why you get the most economical and efficient performance from a Plymouth locomotive expressly made for industrial haulage such as yours. Send us a brief outline of your operation. We'll submit a recommendation without obligation to you. Address: The Fate-Root-Heath Company, Dept. A-1, Plymouth, Ohio.

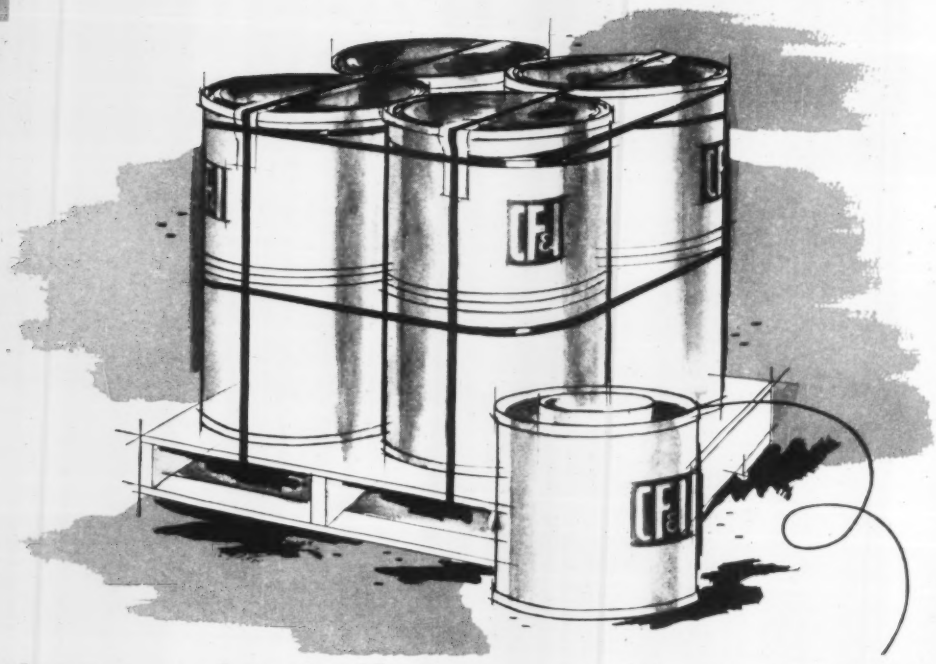
RAIL POWER

# PLYMOUTH® LOCOMOTIVES

WITH TORQOMOTIVE DRIVE

PLYMOUTH LOCOMOTIVES in Progressive Industry throughout the world

# CF&I WIRE IN FIBRE DRUMS



## reduces downtime...cuts scrap loss

CF&I Wire is now packed in fibre drums to keep it rust- and dust-free from the last pass on the drawing frame, through shipping and storage, until the sealed fibre drum is opened at your wireforming machines.

### Less Handling—Longer Runs

CF&I Wire in fibre drums ends the cost and inconvenience of having to handle small coils manually. You get from 400 to 600 lbs. of wire in *one continuous length*. That means less downtime, less scrap loss. Note the following comparison.

| 500 lb. Fibre Drum | 70 lb. Coil | Comparative Results |
|---|---|---|
| Wire Diameter .0468" 170' per lb. Total Footage—85,000' | Wire Diameter .0468" 170' per lb. Total Footage—11,900' | Fibre drum provides 7 times as much continuous production. Reduces necessity for stopping equipment for coil changes. |

If your manufacturing process is not equipped to use fibre drums, order our economical 500-800 lb. capacity reels or non-returnable "spiders." Half fibre drums (holding from 250 to 400 lbs. of wire) and steel strapped or paper wrapped coils are also available. For high or low carbon steel wire; round, flat or shaped; in any size, temper, grade or finish, make CF&I your source of supply.

OTHER CF&I STANDARD PACKAGING METHODS

Returnable spiders (2000-4000 lbs. capacity) | Steel strapped coils (200-2000 lbs.) | Reels (500-800 lbs. capacity) | Steel strapped wooden rack | Non-returnable spiders (500-700 lbs. capacity)

**CF&I WICKWIRE WIRE**

**THE COLORADO FUEL AND IRON CORPORATION**

**THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita • **PACIFIC COAST DIVISION**—Los Angeles • Oakland • Portland • San Francisco • San Leandro • Seattle • Spokane **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia • **CF&I OFFICES IN CANADA:** Montreal • Toronto **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg

6076

and 47 are diluted with water over a wide range—depending on protection desired. For clean metal where long term indoor storage is required, No. 36 is recommended. No. 47 can be used on any metal surface, clean or not.

Both are nonflammable in use, practically odorless, nontoxic, and not susceptible to bacteria growth. Neither will become rancid under normal use. Hot or cold applications can be made by brushing, dipping, or spraying. *Write*: Pennsylvania Refining Co., 2686 Lisbon Rd., Cleveland 4, Ohio. *Phone*: Sweetbriar 5-2400

## Sensitive Metals Heated

Interchangeable, temperature controlled mandrels for preweld and postweld heating of crack-sensitive metals are made for Airline LW 10000 longitudinal and C-20000 series circumferential welding machines.

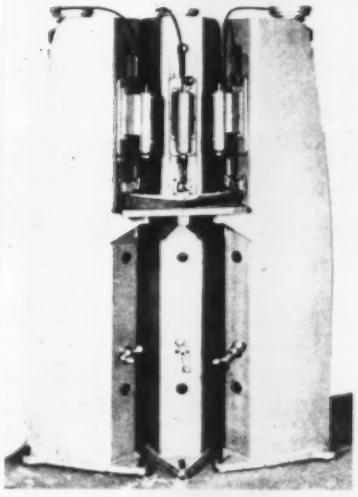
Mandrels are heated by oil. The method eliminates hand heating or problems of disturbed arc. *Write*: Airline Welding & Engineering Corp., 750 N. Prairie Ave., Hawthorne, Calif. *Phone*: Osborn 5-2225

## Driver Uses Stud as Tap

A machine for securing studs in diecastings uses the stud as its own tap. This is accomplished by forcing the stud into the workpiece in timed relation to its rotation.

Several of these triangular units can be grouped about a single fixture to form a special machine capable of placing as many as eight studs in blind holes in less than 1 second.

Three of the units are shown grouped about a single work support fixture for an automotive hood ornament. When a production run is completed, they may be regrouped to handle a completely different workpiece. Their shape allows them



to be grouped to drive studs where centers are within 2 in. of one another. If necessary, eight units could drive studs around the points of a 1-in. radius circle.

Machines are pneumatically driven from a standard 80 psi line. *Write*: Studrive Inc., 2704 E. Larned, Detroit, Mich. *Phone*: Lorain 7-5666

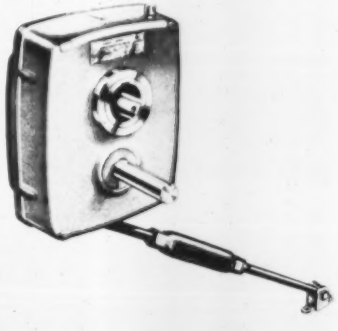
## Reducer Gears Featured

Shaft-mounted speed reducers with capacities from $\frac{1}{4}$ to 40 hp are in stock for quick delivery.

A design feature of the units is the use of high hardness, high capacity gearing designed to provide optimum power transmission efficiency and service life.

Units are equipped with adjustable torque arms, and can be supplied with an enclosed backstop. An interchangeable automatic overload release torque arm, which protects driven machines, motors, and the reducer from excessive shock and overload, is optional.

Offered in single and double reductions with output speeds from 10 to 420 rpm at 1750 rpm input using standard V-belt drives, the reducers are available in shaft sizes from 1-7/16 in. to 3-7/16 in. *Write*: Foote Bros. Gear & Machine Corp., 4545 S. Western Blvd., Chicago, Ill. *Phone*: Virginia 7-4200

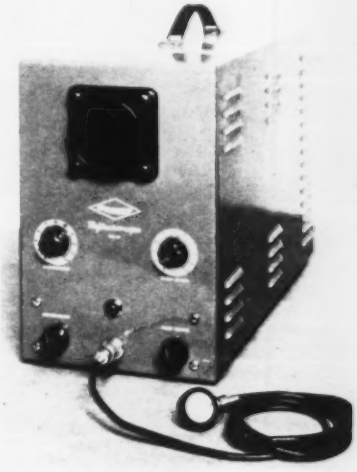


## Reflectoscope Portable

A portable Reflectoscope, identified as Type US, provides high performance, simplified use, and versatile application at low cost.

Field study is made easy by using only four control knobs and a high performance, bright picture, and easily read video trace.

Possible applications: Ultrasonic inspection of plant machinery, axles, studs, bolts, welds, forgings, rail-



road car wheels, dies, pipe, tubing, ingots, billets, blooms, hull plates, and refinery equipment.

The unit weighs 35 lb and measures about 9 in. wide, 19 in. deep, and 14 in. high. *Write*: Sperry Products Inc., Danbury, Conn. *Phone*: Pioneer 8-3581

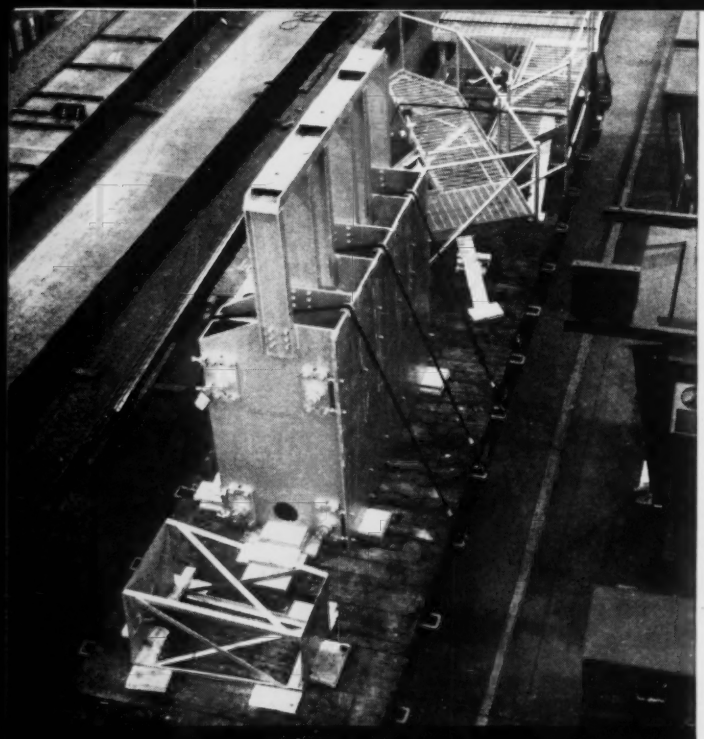
## Marking Automatic

A marking press automatically feeds, marks, and ejects small cylindrical components.

The Series 400, Model 496, has an air-operated press of 6-ton capacity; a six station, motor driven, Geneva index table, and a vibratory parts feeder.

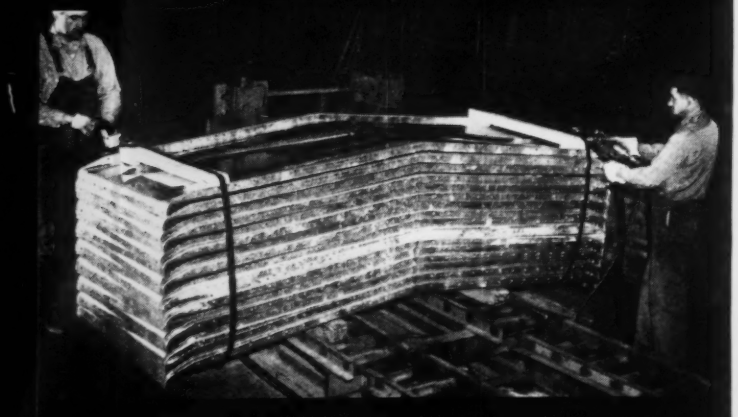
Parts feed directly into the work stations of the index table and are located radially during indexing to

(*Please turn to Page* 180)



ACME STEEL **STEEL STRAPPING** secures and protects electric furnace for shipment by flat car. *(Idea No. U2-3)*

ACME STEEL **STEEL STRAPPING** unitizes aluminum ingots for better handling and storage. *(Idea No. U6-16)*



ACME STEEL **STEEL STRAPPING** unitizes steel stampings for easier handling and shipping. *(Idea No. U6-20)*

# AIM* for better handling, protection, storage

You can gain important materials handling, protection and storage advantages by applying Acme Steel unitizing and carload bracing Ideas to your operations. Safe, secure packages and shipments result in increased handling speed and labor-materials economies, bringing you important savings and greater customer satisfaction. It's easy to find out how.

Located near your plant is an Acme Idea Man thoroughly experienced in product protection for the primary and fabricated metals industries. He is immediately available to discuss your specific problems and provide hundreds of performance-proved Acme Steel Strapping Ideas, without cost or obligation. The seven Ideas on these pages are included among the Ideas-In-Action Reports your Acme Idea Man will be glad to show you. Among these many Reports—all of which have been developed from actual experiences of dozens of industries—are certain to be Ideas that can be applied to your problems, for better, faster, more economical product handling, protection and storage.

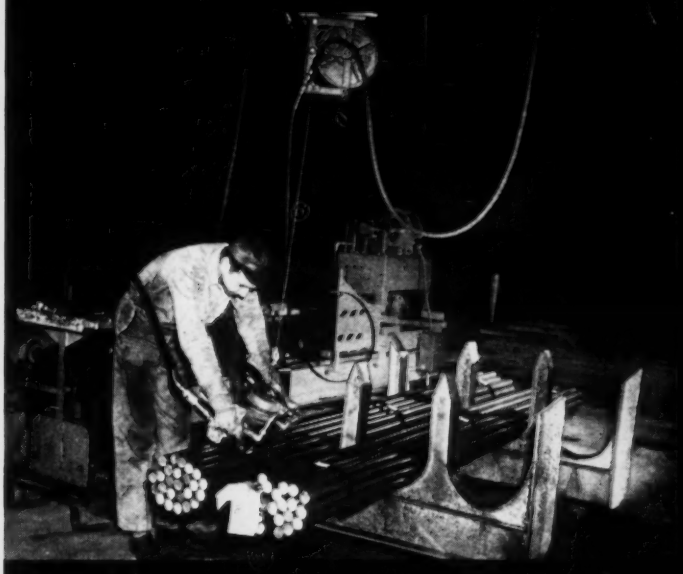
**Your *Acme Idea Man** can be contacted at the nearest Acme Steel Company office. Simply look under "Steel Strapping" in your classified telephone directory, or send the coupon for full facts and information.

ACME STEEL **STEEL STRAPPING**

ACME STEEL **STEEL STRAPPING** braces loads of wire fencing for safe, secure shipment in gondola cars. *(Idea No. U3-1)*

ACME STEEL **STEEL STRAPPING** machine bundles boxes of kitchen utensils for easier handling. *(Idea No. S2-14)*

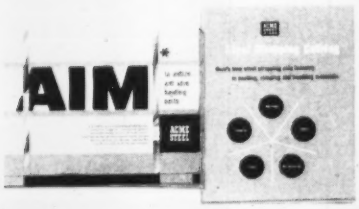
ACME STEEL **STEEL STRAPPING** palletizes heavy wheel and brake assemblies for fast, mechanical handling. *(Idea No. U6-19)*



ACME STEEL **STEEL STRAPPING** applied with pneumatic tools speeds unitizing of cold-drawn steel bars. *(Idea No. U6-18)*

# 2 IDEA BOOKS

These two information packed Acme Steel Idea Books are available to you on request. They will provide dozens of clues to better ways to package and protect your products and plant output.




**Write today for your choice** of the above two Acme Steel Idea Books. Merely indicate the books you want on the coupon at the right and mail. Your request will be filled promptly, with no obligation.

Acme Steel Products Division
**ACME STEEL COMPANY, Dept. SDU-58**
Chicago 27, Illinois

Please send me the new Acme Steel Idea Books I have checked below:

☐ Steel Strapping Catalog ☐ Unitizing Catalog
☐ Have an Acme Idea Man call.

Name_____

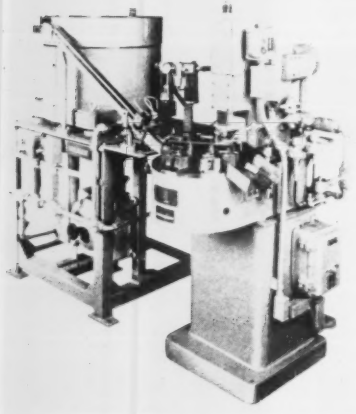
Title_____

Company_____

Address_____

City_____ Zone____ State_____

## NEW PRODUCTS and equipment



the marking station. Workpieces are automatically clamped during marking and ejected by an air blast.

The electrical system (including motors and all controls) is explosion proof. Equipment is designed for long continuous service and will deliver 50 pieces an hour. *Write*: Noble & Westbrook Mfg. Co., East Hartford, Conn. *Phone*: Butler 9-2717

### Rope Design Improved

Herringbone wire rope combines the flexibility and abrasion-resistant characteristics of Lang lay rope with the structural stability of regular lay. It eliminates the expense of stocking two types of rope.

The tough and relatively large outer wires will withstand the friction from continued contact with external objects, while the smaller and highly flexible inner strands enable it to sustain the most severe bending stresses.

Herringbone wire ropes are of the 6 x 37 classification, are preformed, and are 15 per cent stronger than improved plow steel ropes. *Write*: John A. Roebling's Sons Corp., subsidiary of Colorado Fuel & Iron Corp., Trenton, N. J.

### Coating Protects Metals

Irilac #1000, a clear, protective coating for steel and nonferrous metals, contains effective corrosion inhibitors and can be used to replace or enhance other chemical and electrolytic finishing systems.

Using water as a solvent, it eliminates many of the disadvantages of other methods and improves handling and storage characteristics of the surface covered.

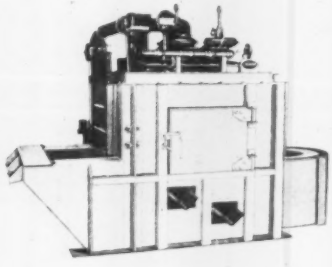
It is furnished as a concentrated solution of a water-soluble polymer with complex corrosion inhibitors, and is applied to the surface by dip, brush, or spray methods.

Neither the solution nor the coating has any chemical effect on the metal or treated metallic surface. Working solutions contain no organic solvents, are nonfuming, and nontoxic. *Write*: Allied Research Products Inc., 4004-06 E. Monument St., Baltimore 5, Md. *Phone*: Peabody 2-9070

### Melt Loss Reduced

Deep bath and radiant roof heating reduce melt loss in these combination melting-holding furnaces. Capacities from 1,200 to 5,000 lb are available. They are gas fired and have automatic temperature controls.

They can be used for diecasting, permanent mold casting, or sand casting of aluminum.

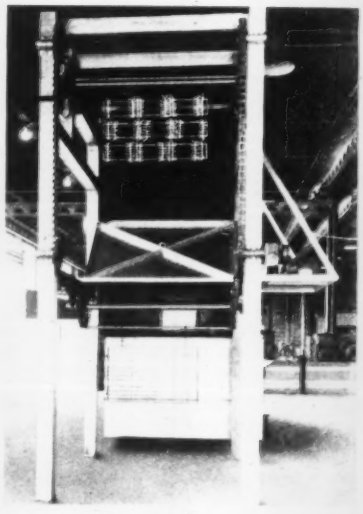


Rejects and back scrap can be charged on the sloping hearth, eliminating contamination of the inside of the furnace. The unit can be built with or without tap holes for complete draining. A bridged ladle-out well allows constant chlorination and a clean supply of metal. *Write*: Industrial Furnace Div., Sunbeam Corp., 4431 W. Ogden Ave., Chicago 23, Ill. *Phone*: Estebrook 8-8000

### Stripping Time Reduced

A conveyorized paint stripping system, using the Kolene molten salt bath process, makes it possible to strip paint from hooks and racks without tying up the paint production line.

The system features automatic, adjustable time cycling which enables one man to load and unload paint-laden hooks and racks from multiple conveyor lines at the same station.



Stripping time averages 1 to 3 minutes. Inventory of hooks and racks can be reduced since it is not necessary to carry a backlog of fixtures while stripping.

Continuous 24-hour stripping is possible because of maintenance features that remove sludge without shutdown. *Write*: Kolene Corp., 12890 Westwood, Detroit 23, Mich. *Phone*: Broadway 3-9200

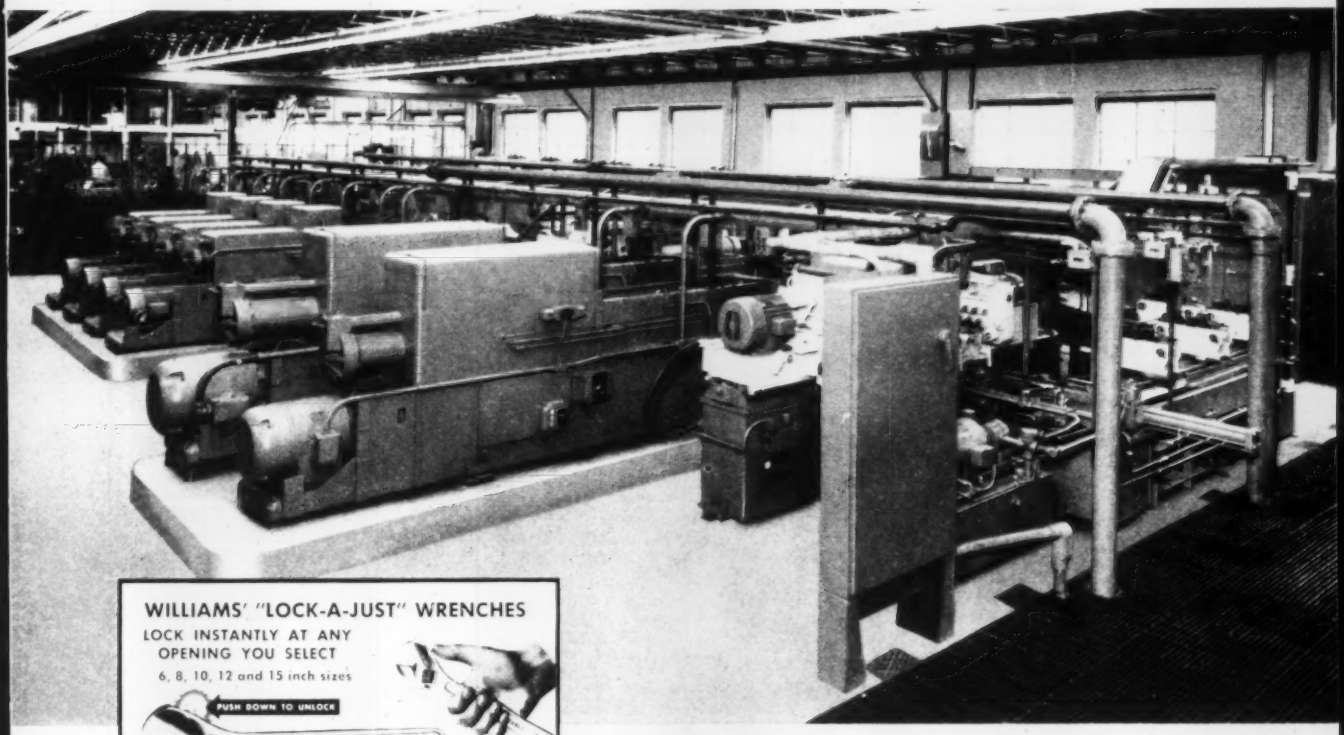
### Gas Truck Sparkproof

Gas-powered fork trucks are produced with a type construction that prevents or reduces the possibility of sparks.

GS-type (gas spark-enclosed) fork trucks are particularly suited (in some cases they are required) for handling flammable materials or for operation where atmospheric conditions present a fire hazard. These machines are approved by Underwriters' Laboratories Inc. Models covered are: Clarklift 20 and 30, and Utilitruc 6024, 8024, and 100.

A dry-type baffle muffler with flame arrester is used to eliminate the exhaust hazard, a two-position emergency pull-out switch permits the operator to disconnect the generator and voltage regulator while the truck is operating, battery terminals are protected by an insulated cover, a dry-type air filter has an internal wire mesh screen as a

# WILLIAMS... First and Only Manufacturer to Use Million Dollar Automated Equipment to Produce Higher Quality Adjustable Wrenches in Volume



WILLIAMS' "LOCK-A-JUST" WRENCHES
LOCK INSTANTLY AT ANY OPENING YOU SELECT
6, 8, 10, 12 and 15 inch sizes
PUSH DOWN TO UNLOCK
PUSH UP TO LOCK
CHROME OR BLACK FINISH
COVERED BY U.S.A. PATENT 2719449
WILLIAMS REGULAR SUPERJUSTABLES
CHROME FINISH
4" thru 24" SIZES Capacities up to 2 1/16
BLACK FINISH
4" thru 18" SIZES Capacities up to 2 1/16
CHROME - PLASTIC HANDLE
4" thru 15" SIZES Capacities up to 1 3/4
DIELECTRIC STRENGTH
(SHORT TIME)—400 VOLTS/MIL. (STEP BY STEP)—285 VOLTS/MIL.
ALL WILLIAMS ADJUSTABLE WRENCHES ARE DROP-FORGED FROM SELECTED ALLOY STEEL AND HEAT-TREATED.

**HERE, AT WILLIAMS,** is the most advanced method used in machining adjustable wrenches. This completely automated transfer machine performs 21 precision operations with unparalleled accuracy. Its performance exceeds all existing standards — to provide you with adjustable wrenches of unmatched quality . . . in quantity.

Retaining all exclusive features which have made them first choice in feel, fit and finish — Williams Adjustable Wrenches now are an even better value at no greater cost than you would pay for ordinary adjustable wrenches.

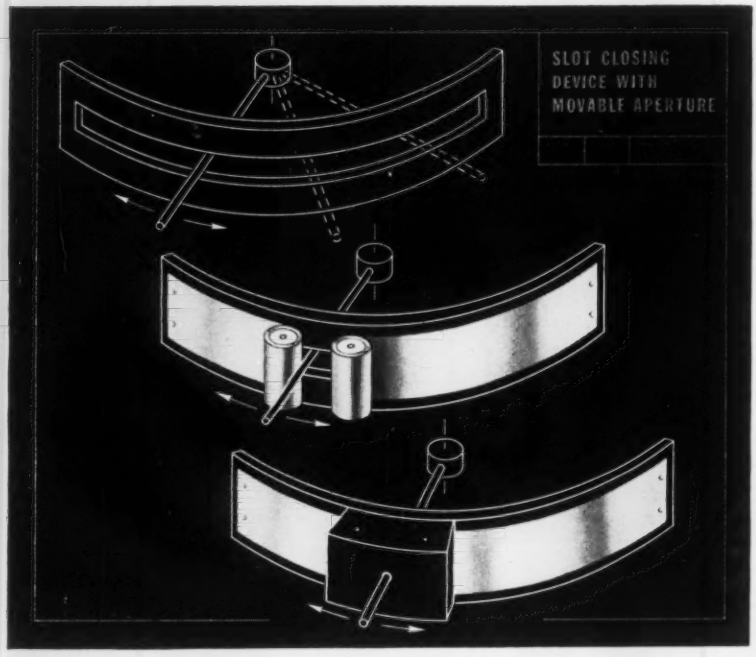
**WILLIAMS**
DROP
**FORGED**
**TOOLS OF INDUSTRY**

FOR PROMPT, PERSONAL SERVICE

INDUSTRIAL DISTRIBUTORS — SERVING INDUSTRY ECONOMICALLY — THE RIGHT HAND OF PRODUCTION

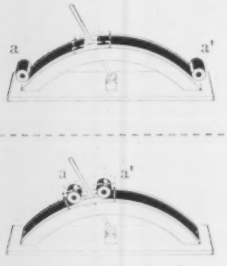
CALL YOUR LOCAL DISTRIBUTOR

**J. H. WILLIAMS & CO.**
406 VULCAN STREET
BUFFALO 7, NEW YORK




*Simplify Slot Closure*

**WITH NEG'ATOR® SPRINGS**




TWO METHODS of mounting NEG'ATORS for slot closure. Above, the free ends of the balanced NEG'ATORS are attached to the traversing unit, the movable aperture, and the NEG'ATOR coils, a and a', are mounted, out of the way, on a stationary section of the equipment. Below, the free ends are fixed and the coils are mounted on the moving member. Where space is available, the mounting below is preferred because of minimized friction.

Paired, equal-force NEG'ATOR Springs, forming flat bands as they uncoil, make an effective cover for slots and provide a movable access through the slot as shown above. This is just another example of how alert engineers have utilized *constant-force* NEG'ATOR Springs to solve unusual design problems.

Slot closure devices incorporating NEG'ATOR Springs are inexpensive, compact and foolproof in operation. Each design utilizes two NEG'ATOR Springs to mask the openings created on either side of the movable aperture. One NEG'ATOR extends as the other re-coils and their equal and unchanging forces counterbalance each other.

Typical application possibilities for NEG'ATOR-equipped slot closure devices include: grinding machine shields, bomber gun turrets, machine tool ways, splash guards, dust enclosures, safety shields, electrical enclosures, and sound baffles—just to mention a few. Can NEG'ATOR Springs solve your particular design problem? Find out more about this versatile component—the first *constant-force* spring—by requesting Bulletin 310N.

**HUNTER SPRING COMPANY**

*19 Spring Avenue, Lansdale, Pennsylvania*

*Manufacturers of:* Precision Springs, NEG'ATOR® & FLEX'ATOR® Constant-Force Springs, Stampings & Assemblies, Retriever Reels, Force Gages, and Wire Fatigue Testers

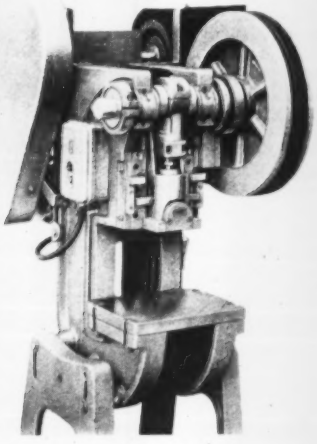

## NEW PRODUCTS and equipment

safeguard against backfire, generator and starter are totally enclosed, and all wiring terminals have protective boots. *Write*: Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich. *Phone*: Woodward 2-6561

### Press Has Quiet Gears

A new type drive mechanism insures quiet operation of this low cost, 15-ton, slow speed punch press.

It is designed for hand feeding, deep drawing, continuous operation, high accuracy roll, hopper, and dial feeding, operating at 100 strokes a minute. Speeds from 50 to 150 strokes a minute are readily obtained by changing a single pulley wheel.



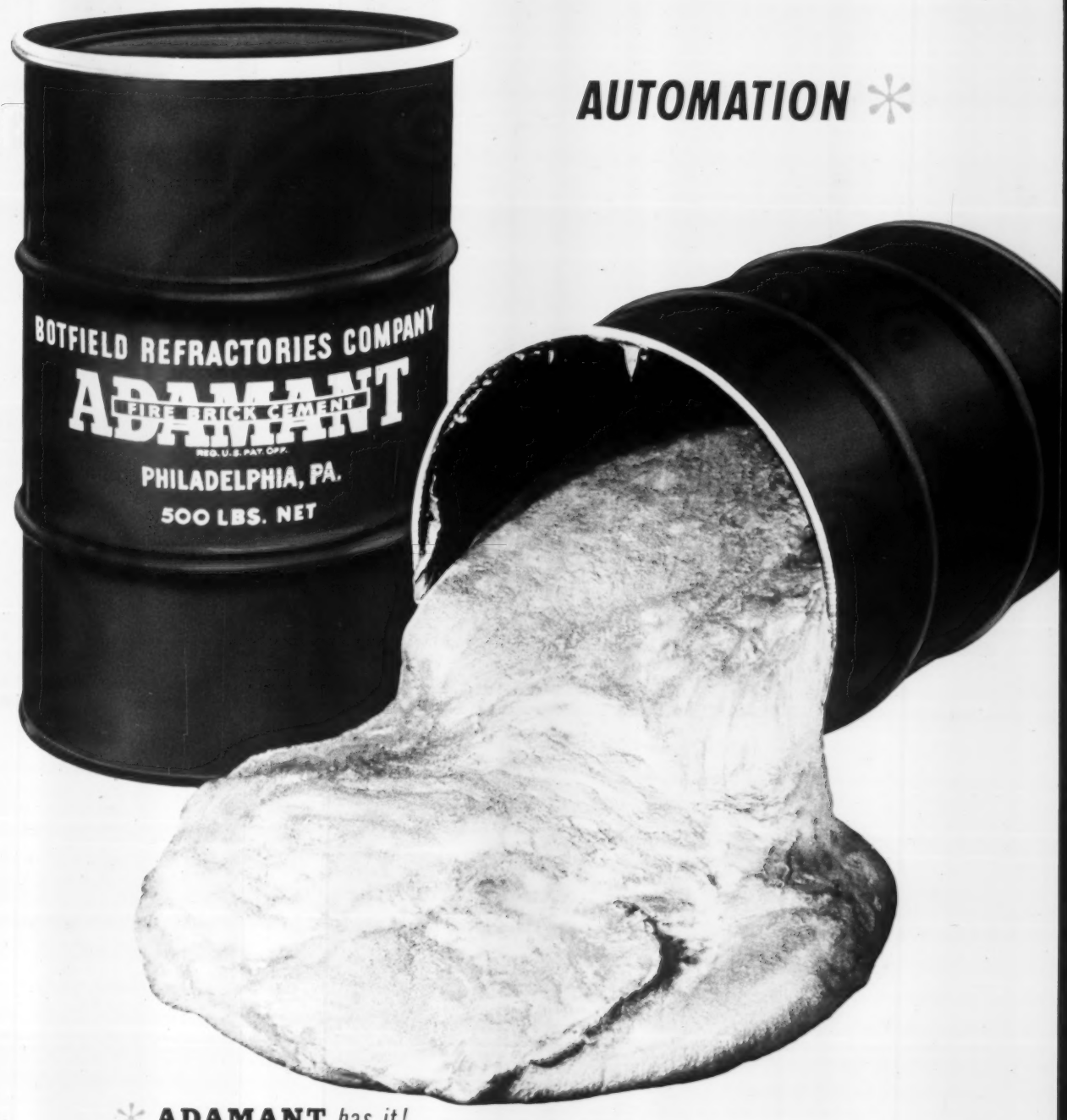
Units are furnished with standard 6-in. throat and 15-in. deep throat. *Write*: Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif. *Phone*: Angelus 1-7955

### Truck Has 30-Ft Lift

Lift truck channels applicable to a 10,000-lb capacity Yale truck which can raise a 4000-lb load to a height of 30 ft for specialized handling and maintenance have an overall collapsed height of about 18 ft (220 in.).

Load capacities are 5300 lb to a height of 300 in., 6600 lb to 240 in., and 8000 lb to 180 in.

Lifting speeds of 20 fpm loaded and 21 fpm empty are possible, and




# AUTOMATION ✻

✻ **ADAMANT** *has it!*

. . . "*automation*" can be had in laying firebrick, too . . . when a firebrick mechanic is able to lay brick after brick, course after course . . . with a cement that remains plastic and smooth with each trowel-full.

Write for Bonding Mortars Bulletin #3 . . . Yellow Pages of 'phone directory have your nearest 'ADAMANT' Distributor.

**Botfield**
FOUNDED 1907
**REFRACTORIES**

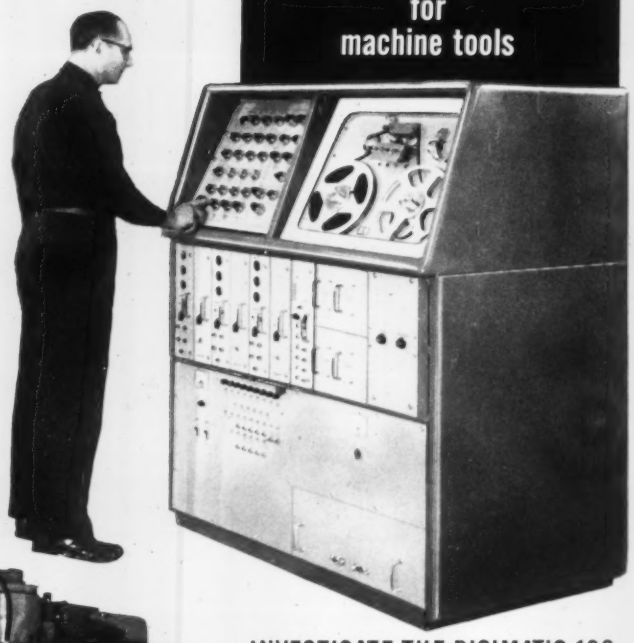
ADAMANT and other ADA products

swanson and clymer sts.
philadelphia 47, penna.

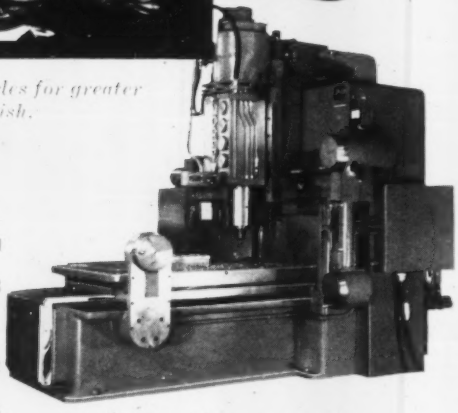
# Reduce Costs Increase Efficiency

# DIGIMATIC

**contour control system for machine tools**



EXCLUSIVE! *Cuts true circles for greater accuracy and smoother finish.*



**FAST...**
- 3½ hours from blueprint to finished piece... for a typical part.
- Director-prepares ½" tapes at 8 times cutting rate.

**ACCURATE...**
- Closed loop servo provides constant check on position.
- Automatic slow-down on inside cuts prevents over-shoots.

**ECONOMICAL...**
- Lowest cost control system, both in purchase price and in operating expense.
- Keyboard "Programming" by machine shop personnel.
- Eliminates cost, maintenance and storage of "hard" tooling.
- Shortens lead times and reduces first-part cost.

## INVESTIGATE THE DIGIMATIC 180 MILLING MACHINE CONTROL!

It's the lowest priced, easiest to operate high-performance contour control system you can purchase today. Commercial deliveries are now being made.

Control illustrated is now in use at Convair-San Diego. This is the first of fifteen DIGIMATIC 180's combined with Morey A50 contour milling machines being delivered to Air Force contractors.

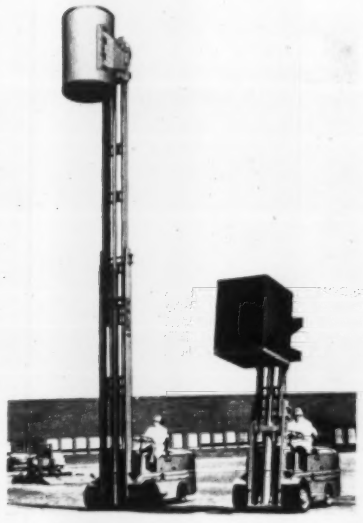
Provides three-axis coordinated control with 100-inches per minute (max.) cutting rate. (± 0.001 inch tolerance.) Compact: 48" wide x 35½" deep x 61" high.

DIGIMATIC Controls are now available on a number of well-known machine tools in a variety of sizes.

*Write for 16-page, illustrated Brochure giving complete details and specifications.*

**ECS**

**ELECTRONIC CONTROL SYSTEMS**
Division of
**STROMBERG-CARLSON COMPANY**
A DIVISION OF GENERAL DYNAMICS CORPORATION
2231 South Barrington Avenue, Los Angeles 64, California



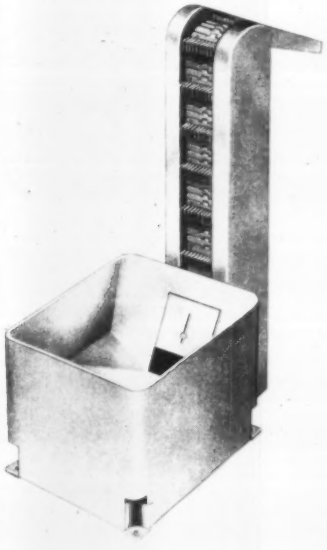
lowering speeds are 31 fpm loaded and 20 fpm empty. For stability, 9-in. face dual drive tires are used at the front, providing 36 in. of tire surface. *Write:* Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa. *Phone:* Orchard 3-1200

## Loading at Floor Level

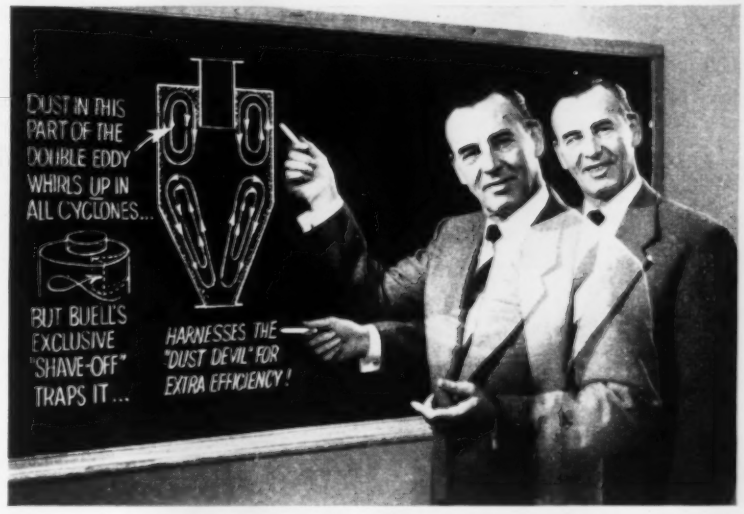
These vertical elevating conveyors save floor space and have floor-level loading.

The design of the self-cleaning cleats practically eliminates slow-

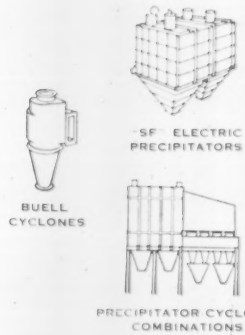
(*Please turn to Page* 188)




# Mastering the double-eddy dust devil leads to extra dust collection efficiency!


DUST IN THIS PART OF THE DOUBLE EDDY WHIRLS UP IN ALL CYCLONES...
BUT BUELL'S EXCLUSIVE "SHAVE-OFF" TRAPS IT...
HARNESSES THE "DUST DEVIL" FOR EXTRA EFFICIENCY!

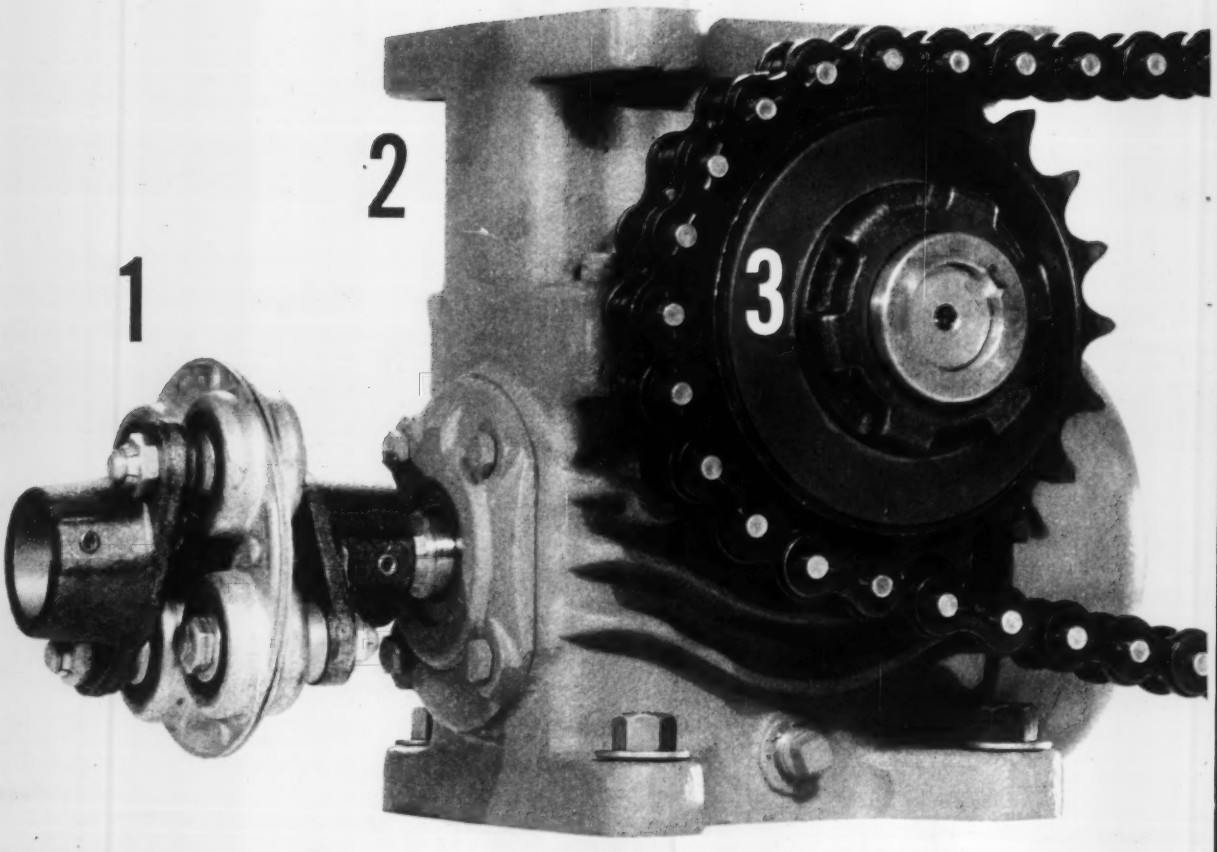
*Only* Buell Cyclones have the "Shave-off" that removes the fines carried in the double-eddy currents, minimizes reentrainment, assures measurably higher dust collection efficiency! Other exclusive extra-efficiency features include *large-diameter* design that eliminates bridging and clogging, proper proportioning for maximum dust separation from the gas stream, extra-heavy-gauge, wear-resistant construction, Buell-designed manifolding that minimizes draft loss, minimizes scouring and eddying. For more information send for a copy of the booklet, "The Exclusive Buell Cyclone." Dept. 26-E, Buell Engineering Company, Inc., 123 William Street, New York 38, N. Y.




buell®

*Experts at delivering Extra Efficiency in*

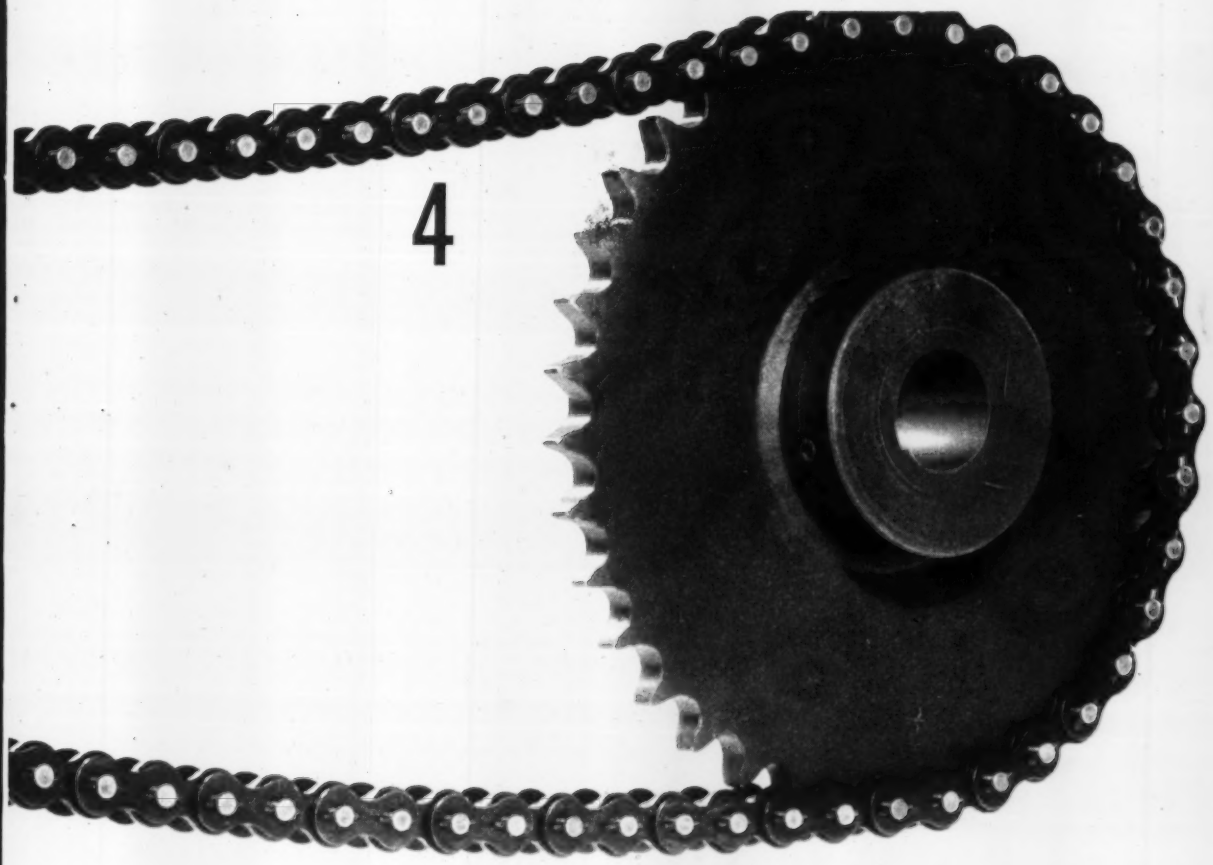
**DUST COLLECTION SYSTEMS**




Morse's entry into the speed reducer field means:

# Nobody can service your as completely as Morse, all four of these power

| 1 Couplings and Driveshafts | 2 Eberhardt-Denver Speed Reducers | 3 Clutches | 4 Chain and "Timing" Belt Drives |
|---|---|---|---|
| Morflex | PoweRgear® | Torque Limiter | Roller Chain |
| Flexible Chain | Worm Gear | Cam | Silent Chain |
| Radial | Helical | Overcenter | Hy-Vo® Drives |
| Nylon | Gearmotors | Pullmore | "Timing"® Belt |




# power transmission needs because only Morse offers transmission components

**REMEMBER:** The toughest jobs in power transmission come to Morse, because *only Morse* offers one-source service on all four of these basic components . . . and backs them up with technical know-how based on over 60 years' experience solving power transmission problems.

IN POWER TRANSMISSION THE TOUGH JOBS COME TO

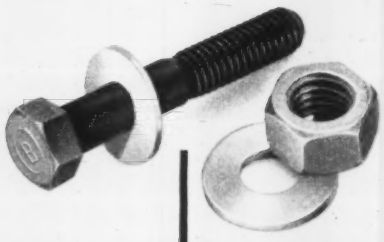
**MORSE** MORSE B-W BORG-WARNER *

*Trademark

**MORSE CHAIN COMPANY, Dept. 2-58, ITHACA, NEW YORK. Export Sales: Borg-Warner International, Chicago 3, Illinois**

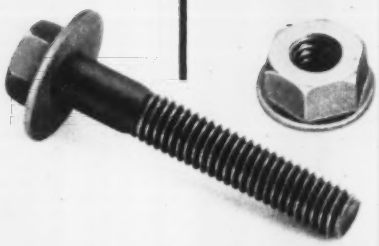
**BEFORE...**

Separate Bolts, Nuts and Washers complicate inventories, increase assembly costs.



**AFTER...**

Washers as integral parts of bolts and nuts eliminate problems, speed assembly at lower cost.



# Save Money

## *by simplifying fastener design*

Here is a simple application of a basic bolt making principle which is affecting substantial savings for a number of manufacturers.

These savings, resulting from simplified design, are realized in every step of the operation from lower first cost of the fasteners through inventory to final assembly. Totalled, they are well worth while.

There are many other basic principles . . . often overlooked in designing and specifying fasteners, which are of importance cost-wise.

**You'll find them** in our new booklet, "How to specify fasteners . . . and save". Filled with drawings and charts, it makes a handy guide in designing or buying any headed parts.

If you can use a copy, write to North Tonawanda or ask a Field Representative.

**BUFFALO BOLT COMPANY**

*Division of Buffalo-Eclipse Corporation*

**North Tonawanda, N. Y. • Princeton, Illinois**

MAKING BOTH FASTENERS AND FRIENDS FOR 100 YEARS

● *3 convenient service centers*

**WESTERN OFFICE** Chicago HArrison 7-2178 | **EASTERN OFFICE** New York City REctor 2-1888 | **CENTRAL OFFICE** North Tonawanda JAckson 2400 (Buffalo)



downs caused by snarling or nesting of parts. Each unit is equipped with a paddle type relay switch arm for automatic starting and stopping, delivering only the parts required in the feeder.

Hopper capacity is approximately 5 cu ft. The bin is formed of 3/16-in. plate with a reinforced top ring for industrial truck loading. *Write*: VFC Div., Automation Devices Inc., Erie, Pa.

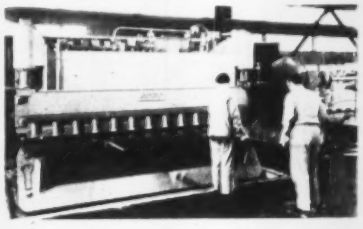
## Lube Has Solid Film

A lubricant, called Surf-Kote M-1284, is a matrix-bonded solid film lubricant, containing molybdenum disulfide. It uses a metallic bonding principle that appreciably increases the number of applications in which a solid dry film can be used for the lubrication of moving parts.

The film will eliminate galling and seizing under extreme pressures and temperatures, is inert to unusual atmospheres, will prevent fretting corrosion, and will facilitate the break-in lubrication of engine parts and other components. *Write*: Sales Promotion Dept., Hohman Plating & Mfg. Co., 814 Vermont Ave., Dayton, Ohio. *Phone*: Baldwin 8-2191

## Rake Angle Adjustable

A hydraulic shear with a rake angle adjustable to any metal thickness from 26 gage to $\frac{1}{4}$ in. cuts stainless steel, aluminum, and most nonferrous alloys. Bending and bowing are eliminated, especially from light gage metals.

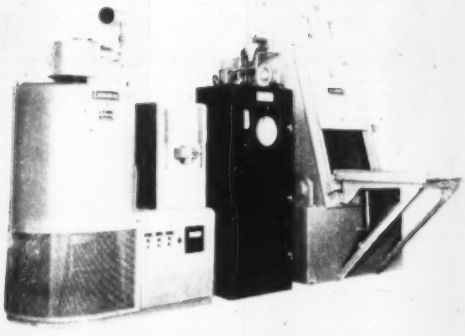


Controlled by a portable pedal, the blade can be stopped instantly at any point during the stroke. The unit cuts sheets from 4 x 12 ft to 7 x 19 ft. *Write*: Pacific Industrial Mfg. Co., 848 49th Ave., Oakland 1, Calif. *Phone*: Andover 1-8303

# What every good metal man should know about CARBONITRIDING

First of all, it is a good idea to know what equipment will do the best carbonitriding job for your specific requirement. And the best way to find this out is to talk over your problems with the people who have consistently developed the methods and equipment for better, more dependable, more economical carbonitriding results. That would be Lindberg.

Let's look at the record. Lindberg's contributions to carbonitriding and carburizing go far beyond just the building of furnaces to do it. It covers the development of controlled atmosphere generators, the creation of dew point equilibrium curves to establish proper atmosphere values for type of steel and temperatures involved and the exclusive Lindberg Carbotrol to maintain these values automatically in production.



*Typical installation of Lindberg Hyen Atmosphere Generator, Lindberg Carbotrol and Lindberg Carbonitriding Furnace.*

Then there is the invention of the "dimple" vertical radiant tube which gave new efficiency and economy to fuel-fired atmosphere furnaces. Lindberg's exclusive CORRTHERM electric heating element made practical the use of electricity in atmosphere furnaces.

Add to this our record over the years of building a broad variety of carbonitriding and carburizing furnaces, big ones, small ones, manuals, automatics, fuel-fired, electric, and it seems it's just good common sense to bring your heat treating problems to us. Just get in touch with the Lindberg Field Representative in your locality or write:

**LINDBERG ENGINEERING COMPANY**

2441 West Hubbard St., Chicago 12, Illinois

Los Angeles Plant: 11937 S. Regentview Ave., at Downey, California.

**LINDBERG**

**heat for industry**

# NEW literature

Write directly to the company for a copy

## Motor Selection Guide

A 12-page bulletin with an application chart is designed to simplify motor selection. Century Electric Co., 18th and Pine Streets, St. Louis 3, Mo.

## Alloy Applications

An 8-page booklet (No. J4) shows principal industrial applications of the low temperature melting Cerro alloys. Listed are 63 known applications. Physical properties of the alloys are given. Alloy Sales Dept., Cerro de Pasco Sales Corp., 300 Park Ave., New York 22, N. Y.

## Advantages of LP-G Trucks

Some of the advantages gained by powering industrial trucks with LP-Gas are listed in a new information sheet. Cited are increased engine life, lower fuel costs, and less exhaust fumes. An LP-Gas system used in the Space Saver truck series is diagrammed and components required are described. Hyster Co., 1003 Myers St., Danville, Ill.

## Sandwich-Type Tubing

The Roll-Bond process allows a designer to create any pattern of tubing, however intricate, within a single homogeneous sheet of metal. The procedure in the creation of this product is described in an 8-page booklet, Roll-Bond Products, Western Brass Mills Div., Olin Mathieson Chemical Corp., East Alton, Ill.

## Magnesium-Ferrosilicon

Specifications for magnesium-ferrosilicon, a low cost source of magnesium for ductile iron, are given in a 4-page folder. Included are data for post inoculation alloys and a description of how magnesium makes iron ductile. Electro Metallurgical Co., division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

## Heating, Air Conditioning

A 12-page bulletin, No. 701, describes the complete line of Herman Nelson heating, ventilating, and air-conditioning products. Convector radiators, finned radiation, unit and console heaters, centrifugal and propeller fans, unit blowers, and industrial exhausters are covered. American Air Filter Co. Inc., 215 Central Ave., Louisville 8, Ky.

## Industrial Television

An 8-page illustrated brochure, "How Many Jobs?" covers a complete line of industrial television equipment for business. Different types of cameras, control units, monitors, accessories, and projection systems are shown. Varied applications including installations with unusual engineering requirements are pictured. General Precision Laboratory, 63 Bedford Rd., Pleasantville, N. Y.

## Resistance Weld Tube Mills

This 64-page handbook describes the electricweld process from roll forming to the finished product. It contains data on operation, capacity, and application of various sized mills. Yoder Co., 5500 Walworth Ave., Cleveland 2, Ohio.

## Tool Steels

Three manuals on tool steels are off the press. "Tool Steel for Forging Operations" illustrates data on heat treatment recommended for dies, punches, projectiles, and other forging uses. "Tool Steels for the Diecasting Process" describes the characteristics of die steels and gives analyzed requirement for all diecasting tools—together with data on quenching, tempering, nitriding, and the influence of lubrication. "Tool Steels for the Hot Extrusion Process" considers recent improvements made in extruding steel and other stronger and harder metals. Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 22, Pa.

## Solid Film Lubricants

A catalog, No. LB-6-1157, describes eight solid film lubricants and their respective applications. They were formulated to solve problems which arose under conditions of temperatures from 1500 to —300 F, corrosion resistance, high loads (225,000 psi), and high speeds (to 30,000 rpm). Coatings can be applied and bonded to the surface of all metals and their alloys including stainless steel, aluminum, titanium, all platings, and such materials as plastics, rubber, glass, ceramics, cork, and wood. Electrofilm Inc., North Hollywood, Calif.

## Roll Forming

A catalog on "Metal Roll Forming" illustrates hundreds of sections, angles, channels, moldings, and tubings available as stock items. Practically any shape not carried in stock can be produced from the metal of the customer's choice. Universal Molding Co., 10807 Stanford Ave., Lynwood, Calif.

## Magnesium Alloys

The design and shop characteristics of the magnesium-thorium alloys (HK31A, HM21A, and HM31XA) are described in a booklet, "Magnesium Alloys for Elevated Temperature Use." It presents data on properties and includes a comparison of structure temperatures of the alloys with those of other metals for different flight times, Mach numbers, and altitudes. Dow Chemical Co., Midland, Mich.

## Metal Preparation

Bulletin 115, a 24-page manual, covers the preparation of metal surfaces for the proper application of Molykote resin-bonded lubricant coatings. Included are instructions for degreasing metals; phosphating stainless steels; sandblasting chrome plate, nickel plate, and stainless; anodizing aluminum and its alloys; dichromate treatment for magnesium and alloys, bright dip treatment for copper and alloys; and the phosphate fluoride coating of titanium and alloys. Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

## Overhead Cranes

A 20-page bulletin, No. 900, describes an entire line of standard overhead traveling cranes. Included are double and single girder types in top-running and underhung designs. Full specifications are shown, including spans, clearance dimensions, electrical and mechanical data, capacities, and weights. Hoist & Crane Div., Robbins & Myers Inc., Springfield, Ohio.

## Cylindrical Grinders

Illustrated catalog B-57 contains complete specifications on 6-in. Type CH and 10-in. Type UCH plain grinders. Landis Tool Co., Waynesboro, Pa.

## Steel-Jacketed Plastic Pipe

A 4-page pamphlet describes rigid plastic pipe encased in a steel jacket. The product, Jal-Jacket, combines the pressure retaining strength of steel with the chemical resisting qualities of unplasticized polyvinyl chloride pipe. Public Relations & Advertising Dept., Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa.

## NEW BOOKS

*Tooling for Metal Powder Parts*, American Society of Tool Engineers, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. 256 pages, $7.50

The latest practical developments in the production of metal powder parts are treated in this manual. Emphasis is placed on planning and tooling for structural parts, such as cams, gears, and latches. The entire process is outlined with information on its advantages and limitations, comparisons with other processes, and case histories illustrating the necessary planning and economics. The volume covers the essential factors involved in designing parts, methods of production and preparation of powders, briquetting techniques, design of briquetting tools, and finishing operations—including sizing, coining, machining, surface cleaning, heat treating, and plating.

*Iron Castings—Compilation of ASTM Standards*, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.75

A single volume of standards relating to iron castings has been brought out to

# Here's the work-horse

## for many a carbonitriding job

*This furnace has* ***complete automatic cycle*** *and quench* ***control.***

**This is the most widely**-used carbonitriding furnace of all. Day in and **day out production of** tons and tons of work has proved this furnace's **ability to increase** production quality and volume and reduce costs. It **is a versatile** furnace, too, not only for carbonitriding but for other uses, **carburizing**, annealing, carbon restoration and many hardening applications.

This type of furnace is available for both manual and automatic operation. It can be equipped either with Lindberg's efficient new vertical radiant tubes for fuel-firing or for electric heating with Lindberg's revolutionary new CORRTHERM element.

Versatile as this furnace is, we don't claim it is the best solution to *every* carbonitriding problem. But, whatever your need may be, talk it over with Lindberg. Our engineers, as they have done in so many instances, will recommend a sound answer—design it, build it, even field-install it if you wish. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality. Lindberg Engineering Company, 2441 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Ave., at Downey, California.

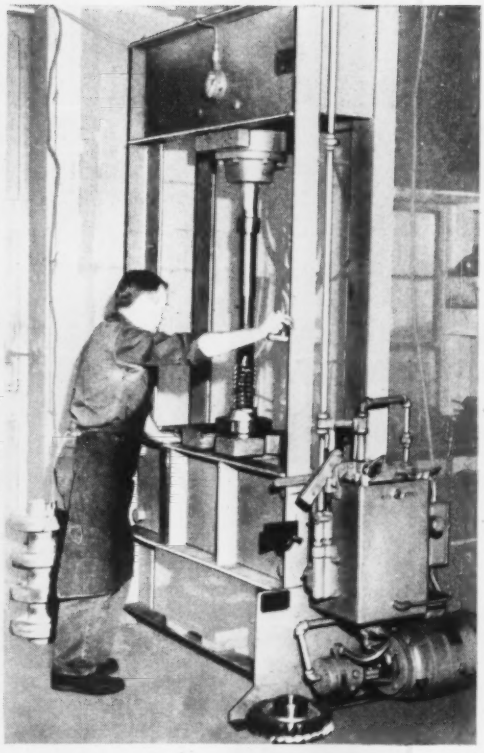
**LINDBERG**

**heat for industry**

**Case History No. 14**

**Licking View Tool & Machine Co.**

This close-up view shows spline broaching of a gear for coal loading equipment as performed at Licking View Tool & Machine Co. on KRW Press 37K-MD3-SP



## KRW PRESS INCREASES PRODUCTION OVER 200% AT LICKING VIEW TOOL & MACHINE CO.

"Our men are able to do spline broaching faster, easier and safer," said Wm. L. Chapin and Eugene A. Embrey of Licking View Tool & Machine Co. when KRW engineers made their regular check-back on this new installation. "Our production has increased at least 200% over our original equipment," Mr. Chapin added. Here is another example of how KRW presses help industry to lower costs and increase profits.

This 100-ton capacity motor operated press, designated 37K-MD3-SP, features a large, usable daylight opening and working area between uprights to give it the necessary capacity to handle larger, heavier jobs. The heavy duty, spring-return ram type hydraulic cylinder with large base and long stroke allows this press to handle big jobs fast, easily and safely with a minimum of bed adjustment. Finger tip control plus adjustment of pressure from 0 to 100 tons add to the flexibility of this unrivaled press.

**SPECIFICATIONS**

| | |
|---|---|
| Capacity | 100 tons |
| Ram Speed — in/max. | 18 |
| Ram Stroke — in. | 12 |
| Daylight — in/max. | 42¼ |
| Opening — L-R in. | 45½ |

Available in hand operated and motor driven models.

*To get full specifications and the complete story on the KRW 37K-MD3-SP write for Bulletin 19.*

**If you have a press problem and are seeking prompt, courteous recommendations and prices, contact your nearest K. R. Wilson representative or write direct.**

HYDRAULICS DIVISION

**K. R. WILSON, Inc.**

**Offices & Factories – 216 Main St., Arcade, N.Y., U.S.A.**


## NEW LITERATURE . . .

meet an industry demand for a book which foundrymen could use as a guide. Contained are 32 standards relating to pig iron, gray iron castings, cast iron pipe, nodular iron castings, malleable iron castings, welding rods and electrodes, and general methods of testing.

*Rolling of Metals*, ASME Research Committee on Plastic Flow of Metals, Research Dept., American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. $4.00 to members, $5.00 to nonmembers.

Quantitative results of normal stress measurements, efforts to measure contact shear stresses, and complete mechanical properties of the test specimens, are included in this book. Tests were conducted, for the most part, on 1 x 1-in. bars of aluminum, copper, and low carbon steel, but included are test results on some bars of ½ x 1, ¼ x 1, ⅛ x 1, and 1/16 x 1 in. Two new phenomena discovered during the investigation were the occurrence of a marked pressure peak near the entry to the contact arc and frequent occurrence of two distinct pressure peaks—one near entry and one near the exit of the contact arc. Both are unpredictable by existing mathematical theory, according to the report, which includes a tentative explanation for them.

*The Metallurgy of Vanadium*, William Rostoker, John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y. 185 pages, $8.50.

This work is a comprehensive treatment of the extraction, properties, and processing of the metal. It will serve as a reference for those who wish to try new materials in special applications.

*Agricola on Metals*, Bern Dibner, Burndy Library, Norwalk, Conn. 128 pages, $2.50.

The mining and metallurgical industries of 16th century Germany used power-operated machinery on a considerable scale, and were familiar with mechanical ventilating and material handling equipment, assembly line methods, industrial laboratories, and other things suggestive of today's mass production.

*Investment Casting Engineering and Design Manual*, produced by members of ICI, Investment Casting Institute, 27 E. Monroe, Chicago 3, Ill. $2.00.

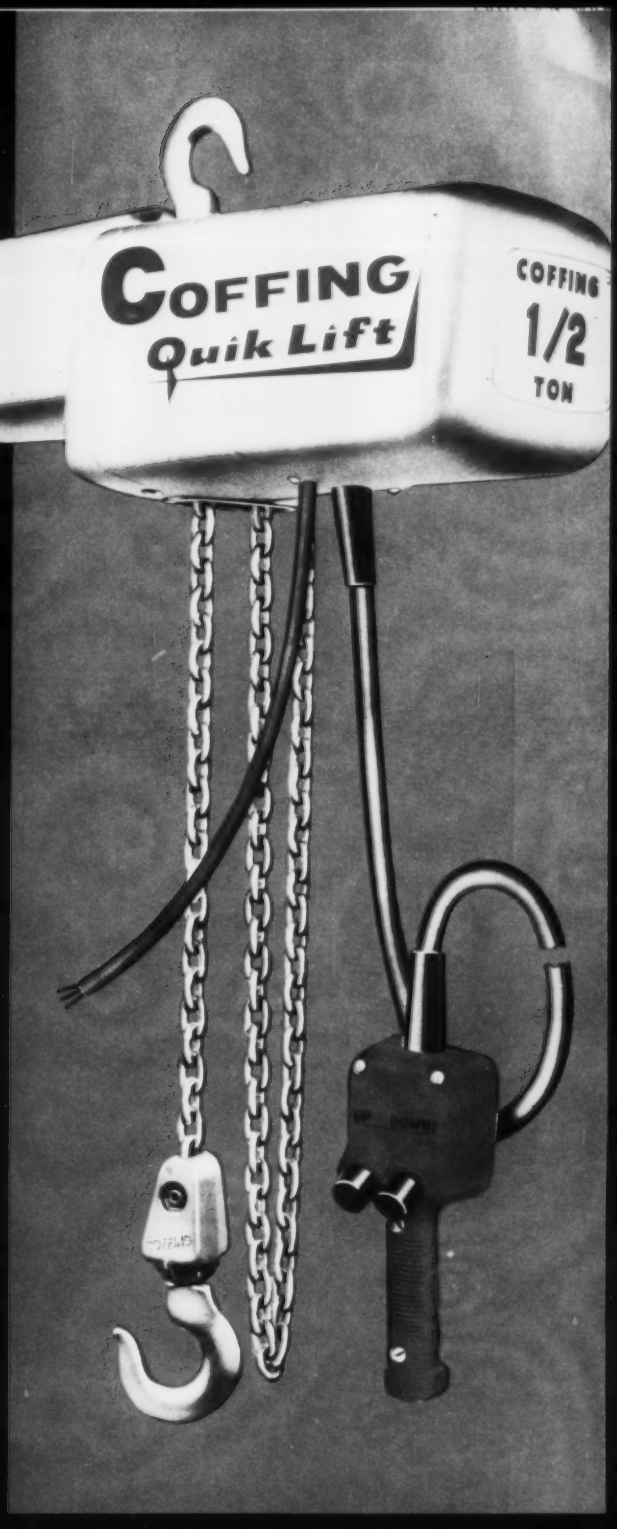
This industrial manual contains information on the advantages and limitations of the investment casting process, metallurgical specifications, specific recommendations for designing—including tolerances that can be expected, and case studies of products that have been economically transformed into investment castings. It includes specific recommended design practices and tolerances for surface finish, radiuses, straightness, flatness, concentricity, roundness, angles, lengths, parallel sections, and blind and throughgoing cores. Engineers, metallurgists, and purchasing agents can obtain a copy without charge from manufacturers who are members of ICI.

# Announcing

## A NEW CONCEPT IN ELECTRIC HOISTS

# The COFFING Quik Lift

## COIL CHAIN ELECTRIC HOIST




Durability with portability has been achieved in the completely new Coffing Quik-Lift electric hoist. The design incorporates the latest advances in metallurgy and metal forming to obtain strong parts which are lightweight.

The die cast aluminum alloy housing is in sections to give quick, easy access to all parts. Changing voltages, type of suspension, or chain is accomplished quickly and easily, so that moving the Quik-Lift from station to station in the plant is a simple operation.

Push-button controls are mechanically interlocked, and the non-conducting plastic station is shaped as a hand grip for pulling the hoist—the control line incorporates a strain cable. For additional safety, control circuits are 115 volts regardless of hoist voltage.

Take advantage of Coffing's new concept of complete flexibility for electric hoists. Your Coffing distributor will be glad to give you complete details, or we will send you the twelve-page Bulletin ADH-65.

- Capacities ¼ to 2 Tons
- Interlocked Push-Button Controls
- Lightweight for Easy Portability
- Convenient Operation
- Accessibility

DUFF-NORTON

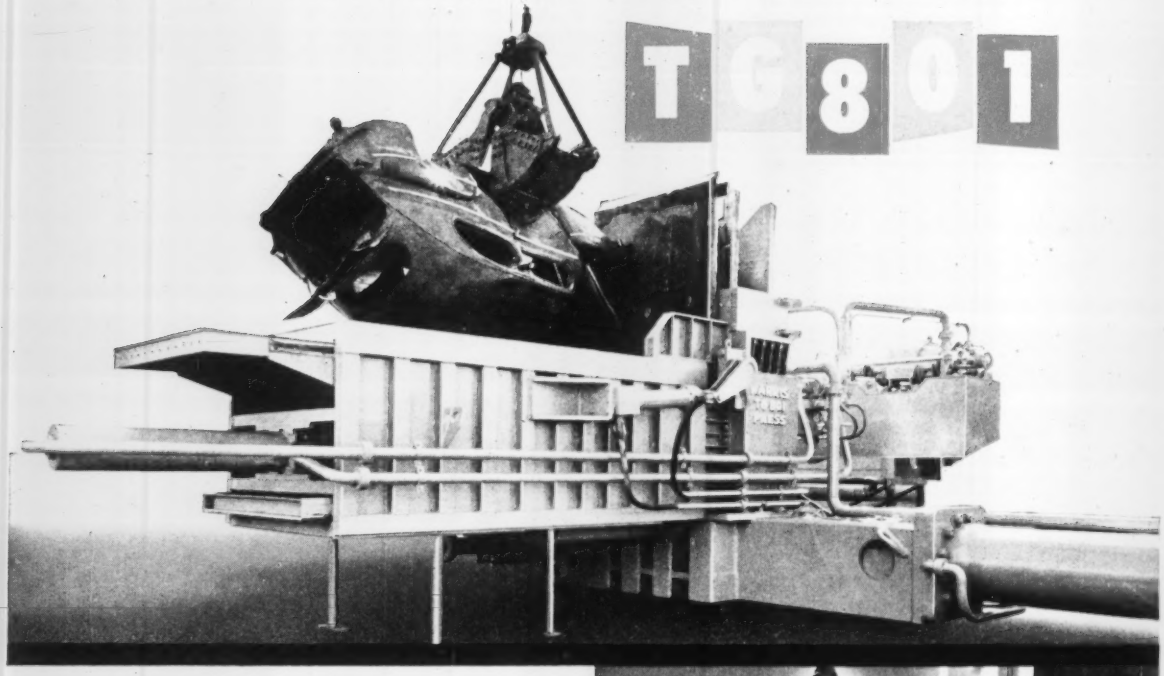
# COFFING HOIST

DIVISION OF

**DUFF-NORTON COMPANY**

800 Walter Street · Danville, Illinois

# LOOK AHEAD WITH A HARRIS TG 801



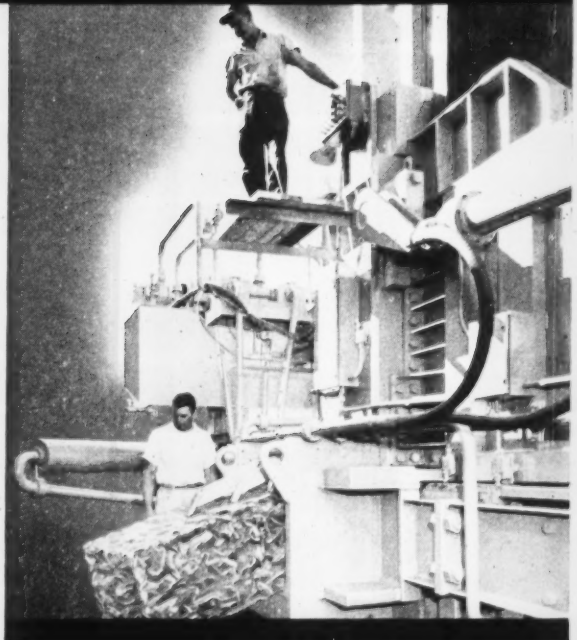
## FIRST COST WELL JUSTIFIED BY PRODUCTION!

This is the press that produces all rectangular hydraulically compressed bundles at a lower cost than any press on the market today. Production is continuous, averaging 12 to 15 tons per hour. It is impossible to make a chair back or L shaped bale with the Harris TG-801. Installation cost is low, and the foundation can be prepared by shallow, bulldozer excavation.

Average No. of bales per hour....35
Average size of bale..20" x 34" x 16"

*Talk with a Man from Harris*

**IT'S A PROFIT MAKER!**



**HARRIS FOUNDRY & MACHINE CO.**

*Reclamation Engineers Since 1889*

CORDELE, GEORGIA

STEEL
May 19, 1958

# Market Outlook

## Production Hits 8-Week High

STEELMAKERS are having their best week in nearly two months. When they tot up the figures on May 18, they'll find production was about 1,390,000 net tons of steel for ingots and castings. Furnaces were operated at 51.5 per cent of capacity, up 1.5 points from the previous week's rate (see Page 204).

In the last three weeks, steelmaking has rebounded from the year's low point to the level of late March. The operating rate has climbed 4.5 points. As much strength has been gained in the three weeks since Apr. 27 as was lost in the five weeks preceding it.

Even without further recovery, May production should approach 6 million tons, easily topping last month's 5.53 million and just beating February's 5.78 million.

**ARMCO's VIEW**—Logan T. Johnston, vice president, Armco Steel Corp., makes this projection: "May will be better than April and June better than May, but second quarter production will be about the same as in the first. The third quarter will start slowly because of July vacations and model changeovers. Then we'll see a rising trend through August as automotive and appliance markets strengthen. Production in each of the first three quarters will be about the same. We won't have made more than 60 million tons by October. In the last quarter we might get up to 25 million. I'd guess about 85 million tons for the year."

**SMILE PLEASE**—In Chicago, Detroit, and Pittsburgh, steelmen are looking less harried. International Harvester Co. reports its farm equipment sales for the six months ended Apr. 30 were 5 per cent over those of a year ago. Its tractor sales for the last week in April were the best of any week in six and a half years. Construction activity is also helping demand. Steelmakers say they're getting bigger orders for wide flange beams, reinforcing bars, merchant pipe, and galvanized sheets.

**AUTOMAKERS BUYING**—Car companies have apparently placed their last steel orders for 1958 models. It's understood General Motors wants to complete component production runs by the end of June so it can do tryout work on '59s. (It doesn't mean final assemblies of 1958 cars will be cut off at the end of June—only that part runs will be completed.) Detroit mills report an influx of inquiries and small orders for die tryout and preproduction runs.

**STOCK TUBES AT TERMINALS**—Aware that the fastest delivery promise gets the order these days, northern steelmakers are stocking drill pipe, casing, and tubing at river barge terminals in the Southwest. Increased competition from Texas and Colorado mills dictated the move. The terminals are owned by trucking companies which get hauling business as well as rent from the plan.

**TIN PLATE TIP-OFF?**—If steel producers intend to raise the price of tin plate July 1, to coincide with increases expected on other products, they'll have to give the can companies 35 days' notice. Look for an announcement to be made by May 27. It may give a hint, too, of the nature of the general steel price increase. If no word comes on tin plate by next week, that could mean steel producers plan to forego increases on some products.

### WHERE TO FIND MARKETS & PRICES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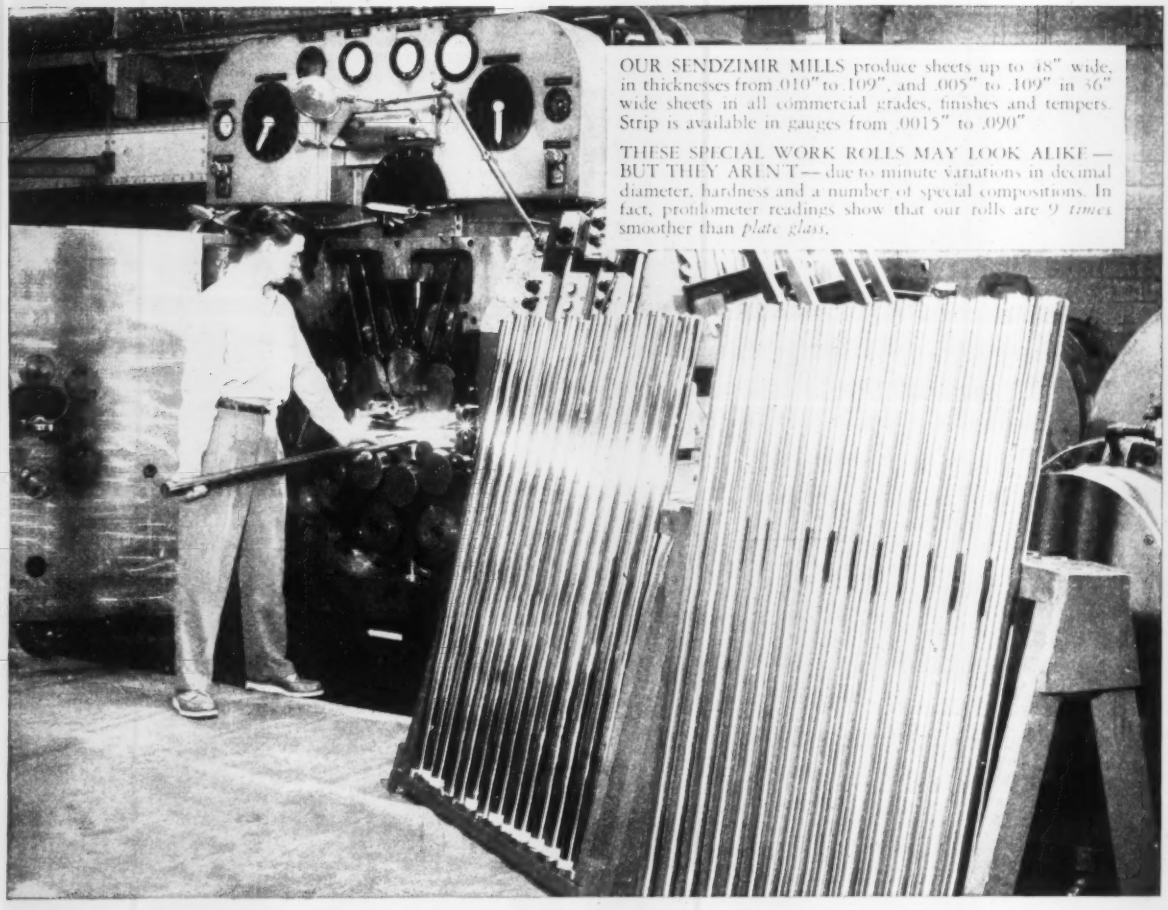
| Wire | 200 | 209 |


OUR SENDZIMIR MILLS produce sheets up to 48" wide, in thicknesses from .010" to .109", and .005" to .109" in 36" wide sheets in all commercial grades, finishes and tempers. Strip is available in gauges from .0015" to .090"
THESE SPECIAL WORK ROLLS MAY LOOK ALIKE — BUT THEY AREN'T — due to minute variations in decimal diameter, hardness and a number of special compositions. In fact, profilometer readings show that our rolls are 9 times smoother than plate glass.

# *It takes more than just a precision mill to produce* STAINLESS STEEL *of MicroRold® quality*

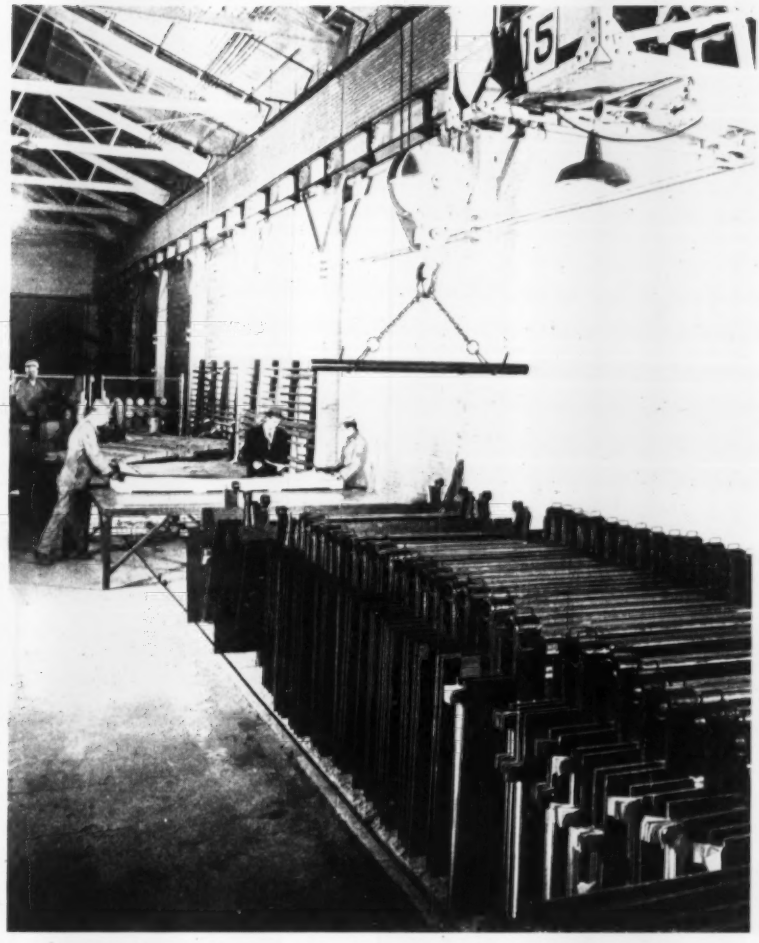
**. . . it takes Operating Know-How. Only Washington Steel, first to use Sendzimir sheet rolling, can offer you 10 years of practical experience with these mills.**

Every hot-rolled stainless steel band has variations in thickness and surface characteristics which must be compensated for in the cold-reduction process to obtain precise gauge and flawless surfaces. To do this, special work rolls with minute diameter differences along the length of the roll are used in controlling such variations as crown, edge and camber. To accurately control all the possible variations requires a large number of these rolls, plus *highly skilled operators* who know from experience which rolls, speeds and reductions are required. These are but a few of important factors in quality rolling which can only be learned by *long* experience and association with precision mills.

Washington Steel is the only producer whose entire production stainless steel sheet and strip is rolled exclusively on the Sendzimir Mill.

**WASHINGTON STEEL CORPORATION**

**5-0 Woodland Avenue • Washington, Pennsylvania**



Titanium Metals offers quick delivery from this Toronto, Ohio, warehouse

# New Life for Titanium

## Shipments begin slow, steady gain. Price reductions, broader knowledge of the metal, and successful forming practices boost its applications

THE TITANIUM industry is still basically sound even though it has been hit by curtailed military requirements, an inventory reduction recession, and a shake-up among producers.

D. W. Kaufmann, sales manager, Titanium Div., Crucible Steel Co. of America, Pittsburgh, says: "Crucible's confidence in the future of titanium is stronger today than ever."

**Change of Pace**—Titanium production soared from 1893 tons in 1955 to 5165 tons in 1956. Output in 1957 climbed to 5658 tons, but much of that entered inventory when military orders fell in midyear. The Air Force's newest bomber, the B-70, is an example of cutbacks. First airframe designs called for 75 per cent titanium by weight. Later designs cut the percentage to 30. The final figure will be closer to 15.

Shipments slumped in the fourth quarter, 1957, as many users worked down their inventories. Deliveries reached a low of 95 tons in November. Early this year, production began to increase. Expectations are that the improvement will continue through the second half.

**Renewed Strength**—Shipments remain below use, producers say, adding: "Inventory depletion should be completed in the third quarter. We can see progress toward reduction of stocks in the advance from 375 tons shipped in 1957's final quarter to 675 tons shipped in this year's first quarter." Forecasts of production this year average 3000 tons, assuming output of 300 tons a month in the second half.

A 3000-ton year will be the industry's third largest, but it won't be good enough to please producers. They say stepped-up sales efforts aimed at potential civilian users are the key to building a strong industry. "We believe that titanium is the best metal, sometimes the only metal, that can do many jobs for civilian industry," say sales managers at Republic Steel Corp., Cleveland.

**Sales Targets** — Among leading nonmilitary users are these industries: Aircraft, chemicals, pulp and paper, shipbuilding, textiles, and metallurgy.

Producers hope to develop applications in electronics (in microminiature tubes), in surgical applications (surgical nails and screws), and in auto production (for trim and truck frames). "There are signs of greater use in guided missiles, especially in high temperature applications such as engines," adds a spokesman for Harvey Aluminum, Torrance, Calif.

Titanium's advantages, not its novelty, are credited for its use. "An ore handler chose titanium plates for an application too corrosive for other metals," Republic reports. "Titanium pipe can carry materials which can't be handled by other metals. Its lightness wins uses in aircraft. Its nonmagnetic properties attract producers of electrical equipment."

**Civilian Drive Planned**—Nonmilitary customers can get as much of the metal as they need. The government has liberalized regulations which formerly reserved 90 per cent of production for the armed forces. Civilian consumption is currently

only 5 per cent, despite freer availability. "We're making gains in our sales to civilian firms," reports Mallory-Sharon Metals Corp., Niles, Ohio.

Producers have mapped a two-pronged drive to bolster civilian consumption. "Substantial price reductions this year should improve competitive position in such applications as heat exchangers, preheater coils, and pressure vessels," say sales managers at Titanium Metals Corp. of America, New York. They point out that prices of mill products have been reduced 45 per cent since 1954.

Producers concede that the metal is "expensive" in comparison with carbon steel and aluminum. They insist it has cost advantages in applications where it's competitive with tantalum, silver, stainless steel, or platinum. "Titanium billets can be purchased for slightly over $4 a pound, which is less than the cost of many high-temperature metals," Crucible says.

A second aim of producers is to broaden public information. "Many potential users haven't tried titanium," complains a Republic salesman. "The industry needs more fabricators of the metal and more understanding of its advantages."

**Workability** — TMCA counters what it terms "a belief that titanium is difficult to work" by publishing a handbook on welding techniques and employing engineers to help fabricators with joining problems. The firm says skilled fabricators discover that working with the metal isn't difficult.

Producers report gradual, but slow, progress toward solving problems arising from military cutbacks in 1957. They say defense requirements appear slightly stronger. "Use in commercial aircraft is encouraging," Crucible adds. "Based on highly successful use of sheets for firewalls and engine nacelles of the DC-7, much larger quantities have been designed into the DC-8, the Convair 880, and the Lockheed Electra."

**Confidence Holds**—Missing this year are any references to titanium as a "wonder metal." Says a Republic sales manager: "Titanium, as a product, is steadily improving. We enjoy greater uniformity in the ingot. Fabricators have added to their knowledge of the metal. We're as confident as before in its potential."

## Sheets, Strip . . .

Sheet & Strip Prices, Pages 208 & 209

Producers report a modest improvement in sheet and strip bookings. One Pittsburgh district mill has received a batch of automotive orders for sheets to be used on 1959 model test runs. Most of the orders specify rush shipment, indicating that inventories are low. Another mill reports a flurry of orders, chiefly from appliance manufacturers.

Paucity of automotive orders leaves a wide gap to be filled. Nevertheless, May bookings are slightly ahead of April's. Price-hedge buying is negligible, although some volume in this category is expected for June delivery.

Eastern stamping shops are maintaining minimum workable inventories and are buying only sufficient tonnages to cover contracts on their books. Some are fairly active. Others, especially shops de-


WEBB PLATE FABRICATING MACHINERY

*Steelworkers* ALL STEEL CONSTRUCTION

DELIVERY 10 DAYS

The Webb Corporation, in presenting the line of new WEBB STEELWORKERS, has designed versatile machines for either job-work or high production work. These units have been engineered to meet the particular need of shops having a variety of work, with a result that all-purpose machines are now available.

Five Complete Tools are Incorporated in a Single Unit.

1. Punch for plate, bars or structurals.
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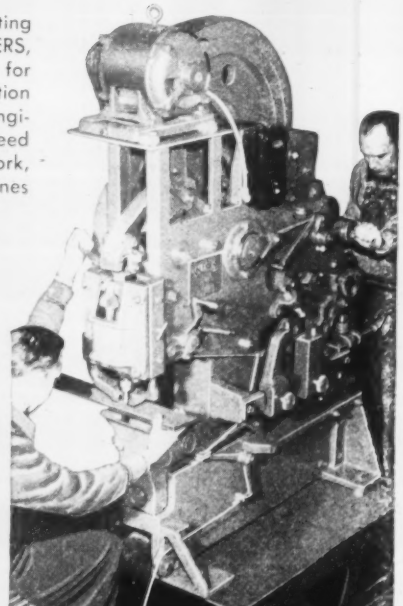
3. Cuts off round and square bars.
4. Shears plates and bars.
5. Coping or notching attachment.

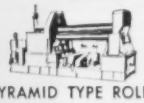
One of the main features of these machines is that they are at all times in complete readiness to do any of the above operations and to do the work well.

The punch may be operated at the same time as either the section cutter, bar cutter, shear or the coping and notching attachment . . . therefore, two operators can work at this machine simultaneously without interference. For illustrated literature and prices, write Dept. D.



*Let Speed PAY—The WEBB Way!*

SLIP ROLLS


PYRAMID TYPE ROLL

INITIAL TYPE ROLL

STEELWORKERS

Also Manufacturers of INDUSTRIAL WEIGHING EQUIPMENT

Since 1881 THE WEBB® CORP.

WEBB CITY, MO., U. S. A.

pending on automotive work, report slow business.

General Stores Supply Office, Navy, Philadelphia, is closing on 250 tons of nailless strapping.

## Reinforcing Bars . . .

Reinforcing Bar Prices, Page 207

Highway construction projects are stimulating activity in the reinforcing bar market. Heavier inquiry for bars is accompanied with increased demand for welded steel highway mesh with pending contracts in Pennsylvania and New York alone involving about 10,000 tons.

Bulk of the bar tonnage being estimated is for public works, including bridges. Sheet and H-beam bearing piling volume also is heavier. Of the 94,500 tons of reinforcing bars for three St. Lawrence Seaway projects which will be placed this month, 72,000 tons have been closed.

## Steel Bars . . .

Bar Prices, Page 207

Orders booked for hot-rolled bars this month are expected to exceed those recorded last month, and are expected to increase further in June. "Our customers' inventories are already below the level that would be reasonable for current business conditions," says one bar supplier in the Pittsburgh district. "During the next month or two, their needs will be a little greater, and they'll be paying more attention to stock replacement."

The possibility of a July 1 price hike may stimulate buying next month, producers believe, but no hedging has been noted so far this month. After rising to a peak in June, bar sales probably will slide back to the April level and continue at that rate through August. Automotive buying is still slow. No pickup is expected from that quarter for several months.

Delivery on bars is possible within two or three weeks, although the unusually large number of small orders complicates mill scheduling. Producers of hot and cold-finished bars are accepting orders which normally go to warehouses.

Defense requirements have dwindled. Forge shop operations are spotty. The Springfield, Mass., Armory will produce 70,000 M-14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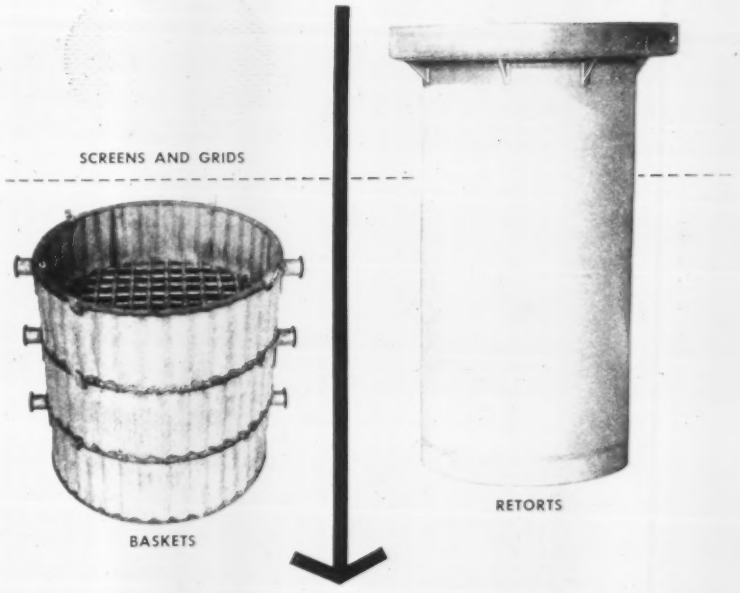


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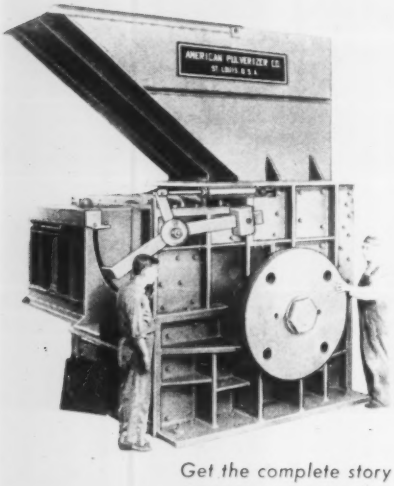


In an hour this capable American Rolling Ring Crusher reduces as much as 50 tons — a carload — of metal turnings . . . or 10 to 20 tons of aluminum castings and or stampings.

It's the American-originated rolling shredder rings of manganese steel that make it possible. Soundly engineered throughout, this 60-50 crusher is fully capable of handling large-scale primary reduction. Whatever your requirements there's an American that matches your need . . . from 10 tons per hour up to 50 tons per hour.

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ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
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rifles, the new basic infantry weapon for U. S. Army and NATO forces. The pilot order is for 15,600 with production on 54,400 to start in October.

## Wire . . .

Wire Prices, Pages 209 & 210

Spring, heading, and manufacturers wire sales are dragging bottom. Buying is still confined to near term requirements. Dullness in numerous industrial grades stems from a lack of automotive demand.

Demand for wire rope has fallen to such a low level in the Pittsburgh area that it has resulted in much price cutting. Instead of selling at the mill price, distributors are frequently splitting their discounts with customers. A typical sales approach: "Tell us what you're paying and we'll give you an extra 5 per cent."

The seasonal pickup in construction needs is moderate, although inquiry for welded highway mesh is heavier. Some minor price-hedge buying has been noted in rods in the eastern market, but this business is negligible in finished wire.

## Tubular Goods . . .

Tubular Goods Prices, Page 211

Use of tubular steel casing, tubing, and drill pipe by the oil industry is expected to jump to 3.5 million tons annually in the next decade, compared with last year's 2.8 million tons, says R. E. Williams, general manager of sales, National Tube Div., U. S. Steel Corp.

Sales of buttweld pipe inched up in April as a result of better weather and stepped-up construction. Seamless pipe held its own. Oil country goods showed no improvement. Outlook for May: Further gains for buttweld; no significant change for other tubular products.

A Pittsburgh mill reports: "Our line pipe business is going along pretty well. If it hadn't been for the Memphis rate case, we'd be running our mills 24 hours a day. It looks like some of the transmission companies will start laying pipe before the Supreme Court reviews the case, so we may get some releases soon."

Consolidated Western Steel Div., U. S. Steel Corp., will soon resume production of small diameter pipe at its mill at Provo, Utah. The

small diameter pipe mill has been closed since December. Large diameter pipe is suffering from a temporary loss of demand.

## Tin Plate . . .

Tin Plate Prices, Page 209

U. S. Steel Corp. will add a continuous annealing line to its tin plate manufacturing facilities at the Columbia-Geneva Div. plant, Pittsburg, Calif. The project will require more than a year and a half to complete. When the line goes into operation, it will supplant some box annealing furnaces.

## Warehouse . . .

Warehouse Prices, Page 212

Despite increasing buying interest from the construction industry, distributors report sales have not improved materially. Improved demand is not expected to develop before late summer.

A move is being made by major distributors in the Southwest to stabilize the reinforcing bar market. The competitive situation in that territory has been extremely keen, causing widespread price cutting.

## Plates . . .

Plate Prices, Page 207

Demand for plates has increased slightly this month, but inquiries indicate that the improvement will not extend into June unless bookings for that month increase soon. Buyers aren't worried about deliveries, so they wait until the last minute before ordering.

A Pittsburgh fabricator says he has a normal inventory of 800 to 1000 tons of plain material. Because of the dearth of new construction orders, he is buying only 60 to 70 per cent of the steel he purchased a year ago. "We're getting a lot of inquiries but nobody's buying," a company official laments. "If it weren't for our backlog, we'd be in trouble."

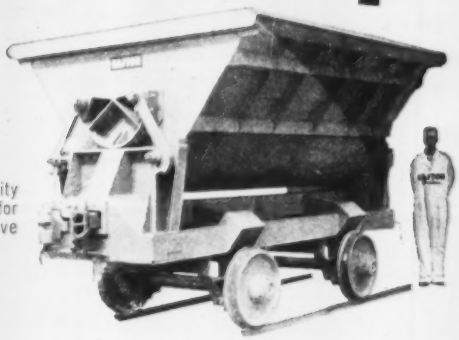
Navy contracts closing this month are heavier, including substantial tonnages of alloy and heat treated plates. Buying by railroad car builders and other leading customers is off.

Fabricated plate work is subjected to sharp competition and margins are lower.

Clad plates are available in four


# Rocker Dumps

CUSTOM BUILT TRADE MARK



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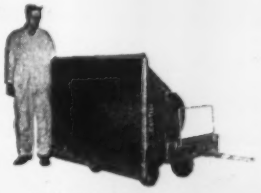

**RD TRAILERS** of all types for handling loose bulk materials of any kind.

IT PAYS to insist on EASTON quality when you buy rocker dump cars or trailers. You pay less in the long run. EASTON cars are built to stand up through more years of dependable heavy service.

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ARONSON Offers You Over 200 PROVEN Standard Stock Models of Quality POSITIONERS "POSITIONEERED" to your exact Requirements

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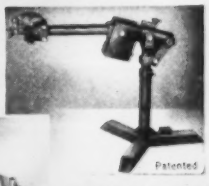
Aronson TracTread (T. M. Reg.) Turning Rolls for thin walled heavy cylindrical work to 27 tons capacity. Zero to 100 IPM turning speed and Built-In Grounding.

Aronson Universal Balance Positioners (T. M. Reg.) position your weldments effectively, instantly for downhand welding. Capacities to 2000 lbs.



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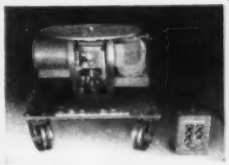
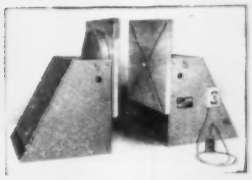
Heavy Duty Precision Built Rubber and Steel Tired Turning and Pipe Rolls, 100% overload protected. Capacities to 600 Tons.

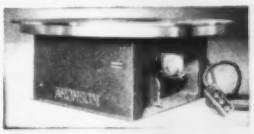
Fully Automatic Gear Driven Positioners, featuring Geared Elevation, 135° Tilting and Variable or Constant Speed Rotation. Capacities to 350,000 lbs.



Model D Gear Driven Positioners. Compact, Precise, Rugged. Capacities to 1000 lbs.

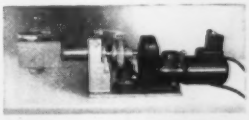


Rugged Head and Tail Stock for positioning bulky weldments between centers. Table Backup for Zero Deflection. Magnetic Braking. Capacities to 160,000 lbs. Geared Elevation Optional.



Heavy Duty Floor Turntables with precision speed control and Magnetic Braking, used for welding, burning, X raying, etc. Capacities to 120,000 lbs., various heights and speeds.

Bench Turntable Automatic Positioners with Mercury Grounding. Capacities to 500 lbs.



Quality POSITIONERS by Aronson MACHINE COMPANY
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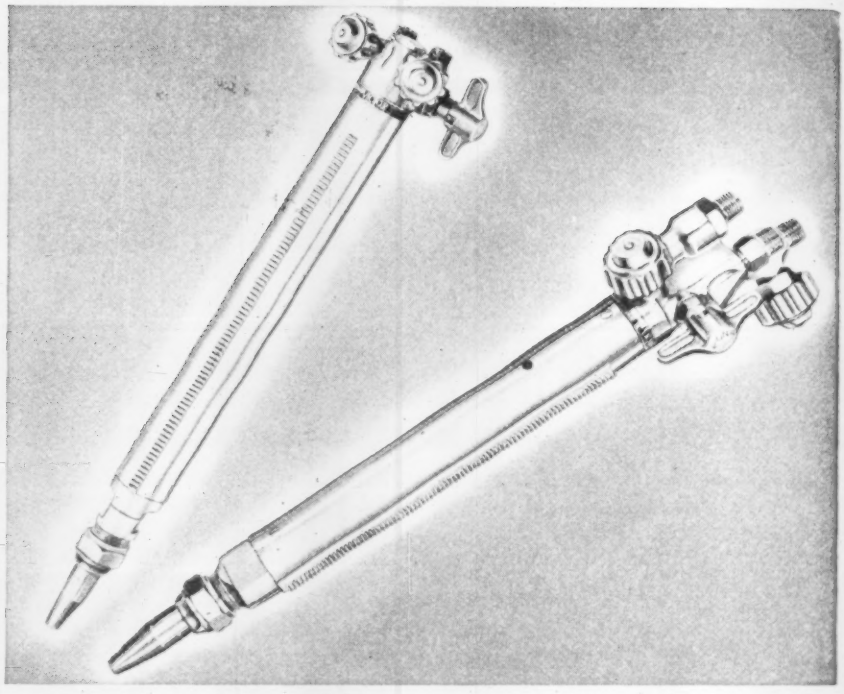

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# MACHINE CUTTING TORCHES

## Two Hose Type

**MT-200 SERIES** for medium pressure acetylene.

**MT-200 LPCG SERIES** for low or medium pressure fuel gases such as city, natural or petroleum gases.

## Three Hose Type

**MT-300A SERIES** for medium pressure acetylene.

**MT-300A LPCG SERIES** for low or medium pressure fuel gases such as city, natural or petroleum gases.

Designed for general purpose machine cutting. All commercial fuel gases commonly used for machine cutting can be utilized by selection of the proper size and type of Victor cutting tips and torch model.

**These New Victor machine cutting torches feature—**

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Time-tested Victor Spiral Mixer for maximum efficiency and heat resistance.

Convenient control valves for ease of operation.

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Preheat gas valves with stainless steel ball points and special packing design to hold valve adjustments steady.

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Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

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to five weeks; some stainless clad plates can be had on shorter notice.

## Cuts Silicon Prices

Prices on all grades of hyperpure silicon have been posted by E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. Reductions, ranging from $5 to $40 a pound, are retroactive to May 1.

The move is expected to broaden the markets for silicon, especially in electronic fields where semiconductors are not used. Du Pont has started production of silicon at its new plant near Brevard, N. C.

## Pig Iron . . .

Pig Iron Prices, Page 212

With gray iron and malleable foundries melting at only about 50 per cent of capacity, pig iron shipments are light. Their inventories are low, but are adequate on the basis of current consumption, especially when they can be bolstered by shipments on short notice.

Steel foundries are operating at 75 to 80 per cent of capacity.

In the Pacific Northwest, foundry operations are estimated at about 80 per cent of capacity. Foreign offers of pig iron are being resumed. Tenders have been received from African sources for good analysis iron at $5 to $6 a ton under domestic prices.

Iron producers in the Buffalo district are shipping from sizable inventories piled up during the winter months. Movement by water out of that city continues slow.

Raritan Arsenal, Metuchen, N. J., closes May 21 on 1250 tons of iron.

## Structural Shapes . . .

Structural Shape Prices, Page 207

Construction is exerting an influence on the structural market, but bookings are smaller than normal for this season.

Fabricating shops are estimating 45,000 tons for bridges to be erected in New England and the Mid-Atlantic district. An additional 10,000 tons is prestressed concrete or alternates.

Structural and other fabricated steel business is marked by low competitive prices. Plain material is firm and fabricators will find it difficult to pass on any increase

(*Please turn to Page* 204)

## Steel Shipments by Markets—March, 1958

(Net tons, all grades)

| Markets | March Tonnages 1958 | March Tonnages 1957 | Total First Three Months 1958 | Total First Three Months 1957 |
|---|---|---|---|---|
| Converting, processing | 239,704 | 332,620 | 666,460 | 956,345 |
| Forgings (except auto) | 58,224 | 108,517 | 179,066 | 328,074 |
| Bolts, nuts, etc. | 59,483 | 110,275 | 185,293 | 361,227 |
| Warehouses: | | | | |
| Oil & gas industry | 55,478 | 245,160 | 245,478 | 702,760 |
| All other | 697,254 | 1,211,517 | 2,008,666 | 3,591,236 |
| Total warehouse | 752,732 | 1,456,677 | 2,254,144 | 4,293,996 |
| Construction: | | | | |
| Rail transportation | 6,116 | 4,560 | 13,021 | 18,487 |
| Oil & gas | 136,693 | 299,939 | 445,162 | 845,810 |
| All other | 467,329 | 816,046 | 1,497,902 | 2,286,411 |
| Total construction | 610,138 | 1,120,545 | 1,957,085 | 3,150,708 |
| Contractors' products | 261,715 | 339,893 | 748,365 | 965,945 |
| Automotive: | | | | |
| Cars, trucks, etc. | 606,035 | 1,185,494 | 2,276,480 | 3,950,108 |
| Forgings | 18,072 | 34,474 | 62,031 | 100,724 |
| Total automotive | 624,107 | 1,219,968 | 2,338,511 | 4,050,832 |
| Rail transportation: | | | | |
| Rails, trackwork, etc. | 57,614 | 169,120 | 181,682 | 479,948 |
| Cars, locomotives, etc. | 90,854 | 288,754 | 288,063 | 772,657 |
| Streetcars, etc. | 2,834 | 1,634 | 4,515 | 7,158 |
| Total transportation | 151,302 | 459,508 | 474,260 | 1,259,763 |
| Shipbuilding, etc. | 70,147 | 99,504 | 235,385 | 269,303 |
| Aircraft | 6,749 | 11,406 | 15,025 | 34,585 |
| Oil & gas drilling | 23,574 | 69,935 | 99,662 | 211,658 |
| Mining, quarrying, etc. | 14,991 | 32,684 | 42,159 | 86,929 |
| Agriculture: | | | | |
| Machinery | 72,545 | 88,570 | 226,659 | 253,976 |
| All other | 18,679 | 18,893 | 45,508 | 48,611 |
| Total agriculture | 91,224 | 107,463 | 272,167 | 302,587 |
| Machinery, tools, etc. | 252,261 | 461,269 | 780,102 | 1,352,409 |
| Electrical machinery, etc. | 141,900 | 190,116 | 424,670 | 596,984 |
| Appliances, etc. | 116,372 | 141,483 | 353,681 | 465,236 |
| Other domestic equipment | 130,784 | 173,747 | 388,516 | 523,487 |
| Containers: | | | | |
| Cans & closures | 444,478 | 684,146 | 1,341,066 | 1,624,514 |
| Barrels, drums, etc. | 65,988 | 69,157 | 168,544 | 224,711 |
| All other | 41,725 | 56,449 | 109,286 | 172,677 |
| Total containers | 552,191 | 809,752 | 1,618,896 | 2,021,902 |
| Ordnance, etc. | 19,941 | 40,955 | 53,582 | 118,812 |
| Nonreported shipments | 49,397 | 80,233 | 154,112 | 235,484 |
| Total domestic shipments | 4,226,936 | 7,366,640 | 13,233,040 | 21,586,266 |
| Exports | 221,590 | 454,976 | 695,635 | 1,103,515 |
| Total shipments | 4,448,526 | 7,821,616 | 13,928,675 | 22,689,781 |

Data from American Iron & Steel Institute.

COWLES

ROTARY KNIVES

SLITTING KNIFE

TRIMMING KNIFE

CARBIDE KNIFE

SPACER

Specify Cowles—world's largest manufacturer of rotary knives—to get more tonnage per grind, and cut production costs. Our exceedingly high standards of precision manufacture and exacting heat treatment assure utmost accuracy, efficiency and long life. Complete line including slitting, trimming and specially engineered knives, in our **Max-cut; Specialloy; Superalloy; Circle C** and **Super C** grades—also carbide knives — for any requirement. Prompt delivery. Engineering help on any job. **Let Cowles quote on your requirements.**

***Write for Bulletin No. 571 Today!***

**COWLES TOOL COMPANY**

**2050 WEST 110th STREET, CLEVELAND 2, OHIO**

*REPRESENTATIVES IN ALL PRINCIPAL CITIES*

(*Continued from Page 203*)

in prices July 1. In fact, the higher costs for material and labor involved in advances nearly a year ago have not been fully passed on, keeping profit margins low.

The U. S. Air Force will contract for 63 steel frame, metal covered, standardized buildings before the yearend. They will be 50 to 60 ft wide, 60 to 180 ft long. Corps of Engineers, Boston, will contract for the structures.

School construction is unusually active in the Seattle area, furnishing a good market for structural shapes. Fabricators have fair order backlogs but increased competition.

## Rails, Cars . . .

**Track Material Prices, Page 210**

Owing to lessened requirements of southeastern railroads for cast iron car wheels, American Brake Shoe Co. will close its Birmingham plant at the end of this month. Operation of the company's steel wheel plant at Calera, Ala., will be continued. Released workers will be given service awards and vacation allowances.

## Semifinished Steel . . .

**Semifinished Prices, Page 207**

Steelmaking operations rose 1½ points last week to 51.5 per cent of capacity. This is the third consecutive weekly advance.

Producers of semifinished steel say customers' inventories are "pretty well under control." They expect demand to be better by the end of May or early June. Any decline in consumption that may develop will be more than offset by a slowdown in inventory liquidation. Toward the end of the third quarter, sales should be rising. By that time, makers of flat-rolled products should be getting more orders from the automotive industry.

## April Steel Output Drops

Steel production dropped to 5,531,000 net tons in April from 6,254,622 tons in March and 9,814,780 tons in April, 1957, reports the American Iron & Steel Institute, New York. Steelmaking facilities were utilized at an average of 47.8 per cent of capacity during April and 52.3 per cent in March (based on Jan. 1, 1958, rating) and 89.5 per cent in April, 1957 (based on Jan. 1, 1957, rating).

Total production of ingots and steel for castings for the first four months of this year came to 24,321,857 tons, compared with 41,399,822 tons for the same period last year.

According to the institute's index of steelmaking, the April, 1958, total was 80.3 in terms of basic index of average production for the period 1947-49. This compared with 87.9 in March, 1958, and 142.6 in April, 1957. Index figure for the first four months of this year was 88.3 against 150.3 for the like period a year ago.

## Steel Ingot Production—April, 1958

| Period | OPEN HEARTH Net tons | OPEN HEARTH Per cent of capacity | BESSEMER Net tons | BESSEMER Per cent of capacity | ELECTRIC Net tons | ELECTRIC Per cent of capacity | TOTAL Net tons | TOTAL Per cent of capacity |
|---|---|---|---|---|---|---|---|---|
| 1958 | | | | | | | | |
| January | 6,085,124 | 58.6 | 121,338 | 35.5 | 547,440 | 44.8 | 6,753,902 | 56.5 |
| February | 5,252,112 | 56.0 | 81,597 | 26.4 | 448,614 | 40.6 | 5,782,323 | 53.6 |
| *March | 5,598,944 | 53.9 | 122,317 | 35.8 | 533,361 | 43.6 | 6,254,622 | 52.3 |
| *1st Qtr. | 16,936,180 | 56.2 | 325,252 | 32.8 | 1,529,425 | 43.1 | 18,790,857 | 54.1 |
| †April | 4,876,000 | 48.5 | 109,000 | 32.9 | 546,000 | 46.2 | 5,531,000 | 47.8 |
| 1957 | | | | | | | | |
| January | 9,829,691 | 99.0 | 294,839 | 77.1 | 884,232 | 86.5 | 11,008,762 | 97.1 |
| February | 8,898,671 | 99.2 | 277,682 | 80.4 | 810,563 | 87.8 | 9,987,206 | 97.6 |
| March | 9,442,164 | 95.1 | 275,156 | 71.9 | 871,754 | 85.2 | 10,589,074 | 93.4 |
| 1st Qtr. | 28,170,526 | 97.7 | 847,677 | 76.3 | 2,566,839 | 86.4 | 31,585,042 | 96.0 |
| April | 8,820,328 | 91.8 | 231,731 | 62.6 | 762,721 | 77.1 | 9,814,780 | 89.5 |
| May | 8,842,707 | 89.1 | 201,864 | 52.8 | 747,752 | 73.1 | 9,792,323 | 86.4 |
| June | 8,498,903 | 88.4 | 210,915 | 57.0 | 681,584 | 68.9 | 9,391,402 | 85.6 |
| 2nd Qtr. | 26,161,938 | 89.8 | 644,510 | 57.4 | 2,192,057 | 73.0 | 28,998,505 | 87.2 |
| 1st 6 Mo. | 54,332,464 | 93.7 | 1,492,187 | 66.8 | 4,758,896 | 79.7 | 60,583,547 | 91.5 |
| July | 8,086,519 | 81.4 | 194,638 | 50.9 | 627,575 | 61.4 | 8,908,732 | 78.6 |
| August | 8,297,172 | 83.6 | 204,723 | 53.5 | 731,995 | 71.6 | 9,233,890 | 81.5 |
| September | 8,135,139 | 84.7 | 185,967 | 50.2 | 656,800 | 66.4 | 8,977,906 | 81.8 |
| 3rd Qtr. | 24,518,830 | 83.2 | 585,328 | 51.5 | 2,016,370 | 66.4 | 27,120,528 | 80.6 |
| 9 Mo. | 78,851,294 | 90.2 | 2,077,515 | 61.7 | 6,775,266 | 75.2 | 87,704,075 | 87.9 |
| October | 8,348,522 | 84.1 | 154,577 | 40.4 | 694,618 | 67.9 | 9,197,717 | 81.1 |
| November | 7,674,698 | 79.9 | 134,709 | 36.4 | 583,512 | 59.0 | 8,392,919 | 76.5 |
| December | 6,783,262 | 68.3 | 108,237 | 28.3 | 528,686 | 51.7 | 7,420,285 | 65.5 |
| 4th Qtr. | 22,806,482 | 77.4 | 397,623 | 35.0 | 1,806,816 | 59.5 | 25,010,921 | 74.4 |
| 2nd 6 Mo. | 47,325,312 | 80.3 | 982,951 | 43.3 | 3,823,186 | 63.0 | 52,131,449 | 77.5 |
| Total | 101,657,776 | 87.0 | 2,475,138 | 54.9 | 8,582,082 | 71.3 | 112,714,996 | 84.5 |

Note—The percentages of capacity operated are based on annual capacities as of Jan. 1, 1958, as follows: Open hearth 122,321,850 net tons; bessemer 4,027,000 net tons; oxygen process, electric and crucible 14,388,740 net tons. Total for 1958, 140,742,570 net tons. For 1957, the capacity tonnages are: Open hearth 116,912,410 net tons; bessemer 4,505,000 net tons; oxygen process, electric and crucible 12,041,740 net tons. Total for 1957, 133,459,150 net tons.
*Revised. †Preliminary.

### DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

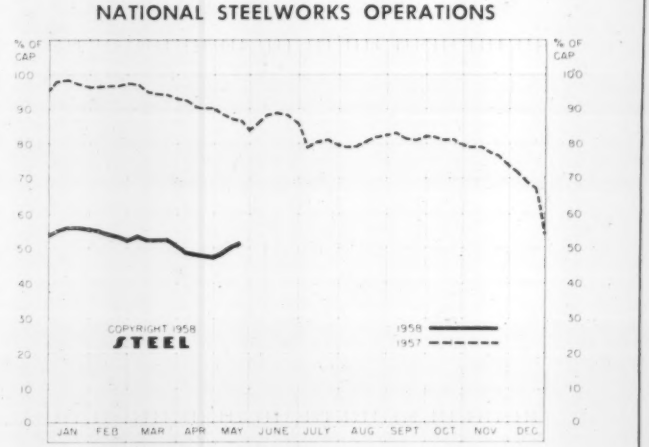
| | Week Ended May 18 | Change | Same 1957 | Week 1956 |
|---|---|---|---|---|
| Pittsburgh | 50.5 | - 0.5 | 90 | 100 |
| Chicago | 57 | + 2.5 | 85 | 100.5 |
| Mid-Atlantic | 48.5 | + 0.5 | 95 | 98.5 |
| Youngstown | 45 | 0* | 81 | 101 |
| Wheeling | 71 | + 3 | 85.5 | 97 |
| Cleveland | 26 | 1.5* | 83 | 95.5 |
| Buffalo | 39 | + 4.5 | 85.5 | 105 |
| Birmingham | 66.5 | + 1.5 | 93.5 | 23.5 |
| New England | 40 | 0 | 54 | 87 |
| Cincinnati | 52 | + 23.5* | 71.5 | 94.5 |
| St. Louis | 77 | + 1.5 | 85.5 | 93.5 |
| Detroit | 36.5 | + 3* | 82.5 | 98 |
| Western | 67 | 0 | 99 | 109 |
| National Rate | 51.5 | + 1.5 | 86.5 | 96.5 |

### INGOT PRODUCTION‡

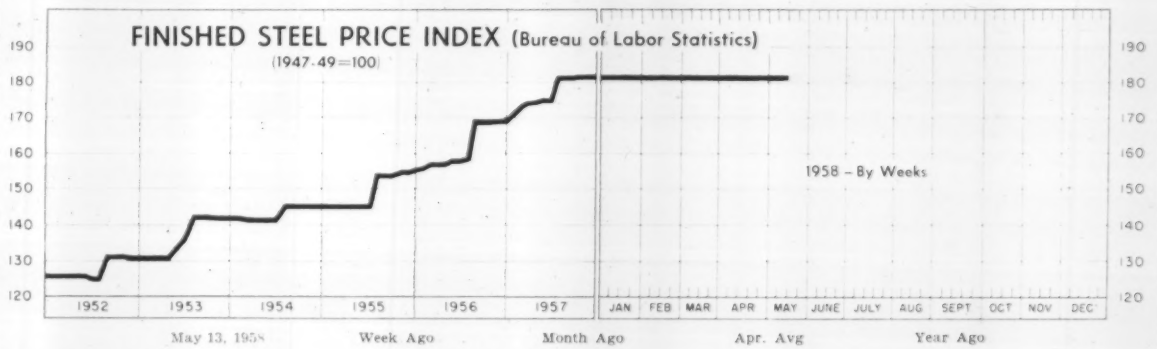
| | Week Ended May 18 | Week Ago | Month Ago | Year Ago |
|---|---|---|---|---|
| INDEX (1947-49 = 100) | 87.2† | 83.0 | 80.0 | 134.2 |
| NET TONS (In thousands) | 1,400† | 1,334 | 1,285 | 2,155 |

*Change from preceding week's revised rate. †Estimated. ‡American Iron & Steel Institute. Weekly capacity (net tons): 2,699,173 in 1958; 2,559,490 in 1957; 2,461,893 in 1956.

### NATIONAL STEELWORKS OPERATIONS



# Price Indexes and Composites




| May 13, 1958 | Week Ago | Month Ago | Apr. Avg | Year Ago |
|---|---|---|---|---|
| 181.7 | 181.7 | 181.6 | 181.6 | 174.4 |

## AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended May 13

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

| | |
|---|---|
| Rails, Standard No. 1 | $5.600 |
| Rails, Light, 40 lb | 7.067 |
| Tie Plates | 6.600 |
| Axles, Railway | 9.825 |
| Wheels, Freight Car, 33 in. (per wheel) | 60.000 |
| Plates, Carbon | 6.150 |
| Structural Shapes | 5.942 |
| Bars, Tool Steel, Carbon (lb) | 0.535 |
| Bars, Tool Steel, Alloy, Oil Hardening Die (lb) | 0.650 |
| Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb) | 1.355 |
| Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb) | 1.850 |
| Bars, H.R., Alloy | 10.525 |
| Bars, H.R., Stainless, 303 (lb) | 0.525 |
| Bars, H.R., Carbon | 6.425 |
| Bars, Reinforcing | 6.135 |
| Bars, C.F., Carbon | 10.360 |
| Bars, C.F., Alloy | 13.875 |
| Bars, C.F., Stainless, 302 (lb) | 0.553 |
| Sheets, H.R., Carbon | 6.192 |
| Sheets, C.R., Carbon | 7.089 |
| Sheets, Galvanized | 8.270 |
| Sheets, C.R., Stainless, 302 (lb) | 0.688 |
| Sheets, Electrical | 12.025 |
| Strip, C.R., Carbon | 9.243 |
| Strip, C.R., Stainless, 430 (lb) | 0.493 |
| Strip, H.R., Carbon | 6.095 |
| Pipe, Black, Buttweld (100 ft) | 19.814 |
| Pipe, Galv., Buttweld (100 ft) | 23.264 |
| Pipe, Line (100 ft) | 199.023 |
| Casing, Oil Well, Carbon (100 ft) | 194.499 |
| Casing, Oil Well, Alloy (100 ft) | 304.610 |
| Tubes, Boiler (100 ft) | 49.130 |
| Tubing, Mechanical, Carbon (100 ft) | 24.953 |
| Tubing, Mechanical, Stainless, 304 (100 ft) | 205.608 |
| Tin Plate, Hot-dipped, 1.25 lb (95 lb base box) | 9.783 |
| Tin Plate, Electrolytic, 0.25 lb (95 lb base box) | 8.483 |
| Black Plate, Canmaking Quality (95 lb base box) | 7.583 |
| Wire, Drawn, Carbon | 10.225 |
| Wire, Drawn, Stainless, 430 (lb) | 0.653 |
| Bale Ties (bundles) | 7.967 |
| Nails, Wire, 8d Common | 9.828 |
| Wire, Barbed (80-rod spool) | 8.719 |
| Woven Wire Fence (20-rod roll) | 21.737 |

## STEEL's FINISHED STEEL PRICE INDEX*

| | May 14 1958 | Week Ago | Month Ago | Year Ago | 5 Yr Ago |
|---|---|---|---|---|---|
| Index (1935-39 avg=100) | 239.15 | 239.15 | 239.15 | 228.59 | 181.31 |
| Index in cents per lb | 6.479 | 6.479 | 6.479 | 6.193 | 4.912 |

## STEEL's ARITHMETICAL PRICE COMPOSITES*

| | May 14 1958 | Week Ago | Month Ago | Year Ago | 5 Yr Ago |
|---|---|---|---|---|---|
| Finished Steel, NT | $145.42 | $145.42 | $145.42 | $140.24 | $110.98 |
| No. 2 Fdry Pig Iron, GT | 66.49 | 66.49 | 66.49 | 64.70 | 55.04 |
| Basic Pig Iron, GT | 65.99 | 65.99 | 65.99 | 64.23 | 54.66 |
| Malleable Pig Iron, GT | 67.27 | 67.27 | 67.27 | 65.77 | 55.77 |
| Steelmaking Scrap, GT | 32.83 | 32.00 | 33.50 | 45.00 | 38.83 |

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

# Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

## FINISHED STEEL

| | May 14 1958 | Week Ago | Month Ago | Year Ago | 5 Yr Ago |
|---|---|---|---|---|---|
| Bars, H.R., Pittsburgh | 5.425 | 5.425 | 5.425 | 5.075 | 3.95 |
| Bars, H.R., Chicago | 5.425 | 5.425 | 5.425 | 5.075 | 3.95 |
| Bars, H.R., deld. Philadelphia | 5.725 | 5.725 | 5.725 | 5.365 | 4.502 |
| Bars, C.F., Pittsburgh | 7.30* | 7.30* | 7.30* | 6.85* | 4.925 |
| Shapes, Std., Pittsburgh | 5.275 | 5.275 | 5.275 | 5.00 | 3.85 |
| Shapes, Std., Chicago | 5.275 | 5.275 | 5.275 | 5.00 | 3.85 |
| Shapes, deld., Philadelphia | 5.545 | 5.545 | 5.545 | 5.31 | 4.13 |
| Plates, Pittsburgh | 5.10 | 5.10 | 5.10 | 4.85 | 3.90 |
| Plates, Chicago | 5.10 | 5.10 | 5.10 | 4.85 | 3.90 |
| Plates, Coatesville, Pa. | 5.10 | 5.10 | 5.10 | 5.25 | 4.35 |
| Plates, Sparrows Point, Md. | 5.10 | 5.10 | 5.10 | 4.85 | 3.90 |
| Plates, Claymont, Del. | 5.10 | 5.10 | 5.10 | 5.70 | 4.35 |
| Sheets, H.R., Pittsburgh | 4.925 | 4.925 | 4.925 | 4.675 | 3.775 |
| Sheets, H.R., Chicago | 4.925 | 4.925 | 4.925 | 4.675 | 3.775 |
| Sheets, C.R., Pittsburgh | 6.05 | 6.05 | 6.05 | 5.75 | 4.575 |
| Sheets, C.R., Chicago | 6.05 | 6.05 | 6.05 | 5.75 | 4.575 |
| Sheets, C.R., Detroit | 6.05-6.15 | 6.05-6.15 | 6.05-6.15 | 5.75-5.85 | 4.775 |
| Sheets, Galv., Pittsburgh | 6.60 | 6.60 | 6.60 | 6.30 | 5.075 |
| Strip, H.R., Pittsburgh | 4.925 | 4.925 | 4.925 | 4.675 | 3.975-4.225 |
| Strip, H.R., Chicago | 4.925 | 4.925 | 4.925 | 4.675 | 3.725 |
| Strip, C.R., Pittsburgh | 7.15 | 7.15 | 7.15 | 6.85 | 5.10-5.80 |
| Strip, C.R., Chicago | 7.15 | 7.15 | 7.15 | 6.85 | 5.35 |
| Strip, C.R., Detroit | 7.25 | 7.25 | 7.25 | 6.95 | 5.30-6.05 |
| Wire, Basic, Pittsburgh | 7.65 | 7.65 | 7.65 | 7.20 | 5.225-5.475 |
| Nails, Wire, Pittsburgh | 8.95 | 8.95 | 8.95 | 8.49 | 6.35 |
| Tin plate (1.50 lb) box, Pitts. | $10.30 | $10.30 | $10.30 | $10.30 | $8.95 |

*Including 0.35c for special quality.

## SEMIFINISHED STEEL

| | | | | | |
|---|---|---|---|---|---|
| Billets, forging, Pitts. (NT) | $96.00 | $96.00 | $96.00 | $91.50 | $70.50 |
| Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts. | 6.15 | 6.15 | 6.15 | 5.80 | 4.425 |

## PIG IRON, Gross Ton

| | May 14 1958 | Week Ago | Month Ago | Year Ago | 5 Yr Ago |
|---|---|---|---|---|---|
| Bessemer, Pitts. | $67.00 | $67.00 | $67.00 | $65.50 | $55.50 |
| Basic, Valley | 66.00 | 66.00 | 66.00 | 64.50 | 54.50 |
| Basic, deld., Phila. | 70.41 | 70.41 | 70.41 | 68.38 | 59.25 |
| No. 2 Fdry, Neville Island, Pa. | 66.50 | 66.50 | 66.50 | 65.00 | 55.00 |
| No. 2 Fdry, Chicago | 66.50 | 66.50 | 66.50 | 65.00 | 55.00 |
| No. 2 Fdry, deld., Phila. | 70.91 | 70.91 | 70.91 | 68.88 | 59.75 |
| No. 2 Fdry, Birm. | 62.50 | 62.50 | 62.50 | 59.00 | 51.38 |
| No. 2 Fdry (Birm.) deld. Cin. | 70.20 | 70.20 | 70.20 | 66.70 | 58.93 |
| Malleable, Valley | 66.50 | 66.50 | 66.50 | 65.00 | 55.00 |
| Malleable, Chicago | 66.50 | 66.50 | 66.50 | 65.00 | 55.00 |
| Ferromanganese, Duquesne | 245.00† | 245.00† | 245.00† | 255.00† | 228.00* |

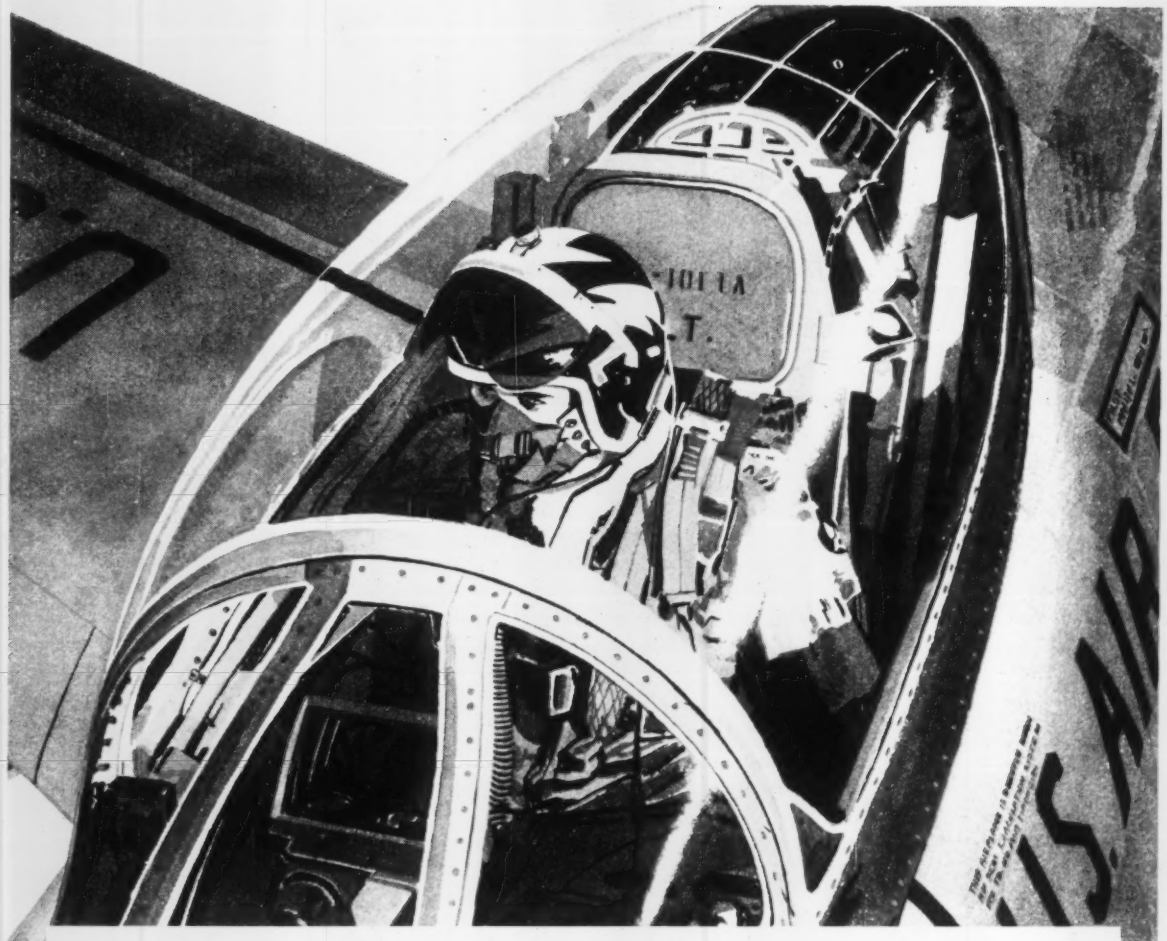
†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

## SCRAP, Gross Ton (Including broker's commission)

| | | | | | |
|---|---|---|---|---|---|
| No. 1 Heavy Melt, Pittsburgh | $31.50 | $31.50 | $33.50 | $44.50 | $39.50 |
| No. 1 Heavy Melt, E. Pa. | 34.50 | 34.50 | 37.00 | 50.00 | 41.00 |
| No. 1 Heavy Melt, Chicago | 32.50 | 30.00 | 30.00 | 40.50 | 36.00 |
| No. 1 Heavy Melt, Valley | 33.50 | 33.50 | 32.50 | 43.50 | 41.50 |
| No. 1 Heavy Melt, Cleve. | 30.50 | 30.50 | 29.50 | 38.50 | 39.00 |
| No. 1 Heavy Melt, Buffalo | 26.50 | 26.50 | 28.50 | 40.50 | 41.75 |
| Rails, Rerolling, Chicago | 50.50 | 49.00 | 53.50 | 58.50 | 47.50 |
| No. 1 Cast, Chicago | 38.50 | 38.50 | 38.50 | 40.50 | 41.50 |

## COKE, Net Ton

| | | | | | |
|---|---|---|---|---|---|
| Beehive, Furn., Connlsvl. | $15.25 | $15.25 | $15.25 | $15.25 | $14.75 |
| Beehive, Fdry., Connlsvl. | 18.25 | 18.25 | 18.25 | 18.00 | 17.00 |



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**INDUSTRIAL TAPES**

THE KENDALL COMPANY
Polyken Sales Division

# Steel Prices

Mill prices as reported to STEEL, May 14, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 208; to footnotes, page 210.

## SEMIFINISHED

**INGOTS, Carbon, Forging (NT)**
Munhall,Pa. U5 ... $73.50

**INGOTS, Alloy (NT)**
Detroit S41 ... $77.00
Farrell,Pa. S3 ... 77.00
Lowellville, O. S3 ... 77.00
Midland,Pa. C18 ... 77.00
Munhall,Pa. U5 ... 77.00
Sharon,Pa. S3 ... 77.00

**BILLETS, BLOOMS & SLABS**
**Carbon, Rerolling (NT)**
Bessemer,Pa. U5 ... $77.50
Buffalo R2 ... 77.50
Clairton,Pa. U5 ... 77.50
Ensley,Ala. T2 ... 77.50
Fairfield,Ala. T2 ... 77.50
Fontana,Calif. K1 ... 88.00
Gary,Ind. U5 ... 77.50
Johnstown,Pa. B3 ... 77.50
Lackawanna,N.Y. B2 ... 77.50
Munhall,Pa. U5 ... 77.50
Owensboro,Ky. G8 ... 77.50
S.Chicago,Ill. R2, U5 ... 77.50
S.Duquesne,Pa. U5 ... 77.50
Sterling,Ill. N15 ... 77.50
Youngstown R2 ... 77.50

**Carbon, Forging (NT)**
Bessemer,Pa. U5 ... $96.00
Buffalo R2 ... 96.00
Canton,O. R2 ... 98.50
Clairton,Pa. U5 ... 98.00
Conshohocken,Pa. A3 ... 101.00
Ensley,Ala. T2 ... 96.00
Fairfield,Ala. T2 ... 96.00
Fontana,Calif. K1 ... 105.50
Gary,Ind. U5 ... 96.00
Geneva,Utah C11 ... 96.00
Houston S5 ... 101.00
Johnstown,Pa. B2 ... 96.00
Lackawanna,N.Y. B2 ... 96.00
Los Angeles B3 ... 105.50
Midland,Pa. C18 ... 96.00
Munhall,Pa. U5 ... 96.00
Owensboro,Ky. G8 ... 96.00
Seattle B3 ... 109.50
Sharon,Pa. S3 ... 96.00
S.Chicago R2, U5 W14 ... 96.00
S.Duquesne,Pa. U5 ... 96.00
S.SanFrancisco B3 ... 105.50
Warren,O. C17 ... 96.00

**Alloy, Forging (NT)**
Bethlehem,Pa. B2 ... $114.00
Bridgeport,Conn. C32 ... 114.00
Buffalo R2 ... 114.00
Canton,O. R2, T7 ... 114.00
Conshohocken,Pa. A3 ... 121.00
Detroit S41 ... 114.00
Economy,Pa. B14 ... 114.00
Farrell,Pa. S3 ... 114.00
Fontana,Calif. K1 ... 135.00
Gary,Ind. U5 ... 114.00
Houston S5 ... 119.00
Ind.Harbor,Ind. Y1 ... 114.00
Johnstown,Pa. B2 ... 114.00
Lackawanna,N.Y. B2 ... 114.00
LosAngeles B3 ... 134.00
Lowellville,O. S3 ... 114.00
Massillon,O. R2 ... 114.00
Midland,Pa. C18 ... 114.00
Munhall,Pa. U5 ... 114.00
Owensboro,Ky. G8 ... 114.00
Sharon,Pa. S3 ... 114.00
S.Chicago R2,U5,W14 ... 114.00
S.Duquesne,Pa. U5 ... 114.00
Struthers,O. Y1 ... 114.00
Warren,O. C17 ... 114.00

**ROUNDS, SEAMLESS TUBE (NT)**
Buffalo R2 ... $117.50
Canton,O. R2 ... 120.00
Cleveland R2 ... 117.50
Gary,Ind. U5 ... 117.50
S.Chicago,Ill. R2, W14 ... 117.50
S.Duquesne,Pa. U5 ... 117.50
Warren,O. C17 ... 117.50

**SKELP**
Aliquippa,Pa. J5 ... 5.075
Munhall,Pa. U5 ... 4.875
Pittsburgh J5 ... 5.075
Warren,O. R2 ... 4.875
Youngstown R2, U5 ... 4.875

**WIRE RODS**
AlabamaCity,Ala. R2 ... 6.15
Aliquippa,Pa. J5 ... 6.15
Alton,Ill. L1 ... 6.35
Buffalo W12 ... 6.15
Cleveland A7 ... 6.15
Donora,Pa. A7 ... 6.15
Fairfield,Ala. T2 ... 6.15
Houston S5 ... 6.40
IndianaHarbor,Ind. Y1 ... 6.15
Johnstown,Pa. B2 ... 6.15
Joliet,Ill. A7 ... 6.15
KansasCity,Mo. S5 ... 6.40
Kokomo,Ind. C16 ... 6.25
LosAngeles B3 ... 6.95
Minnequa,Colo. C10 ... 6.40
Monessen,Pa. P7 ... 6.15
N.Tonawanda,N. Y. B11 ... 6.15
Pittsburg,Calif. C11 ... 6.95
Portsmouth,O. P12 ... 6.15
Roebling,N.J. R5 ... 6.25
S.Chicago,Ill. R2 ... 6.15
SparrowsPoint,Md. B2 ... 6.25
Sterling,Ill.(1) N15 ... 6.15
Sterling,Ill. N15 ... 6.25
Struthers,O. Y1 ... 6.15
Worcester,Mass. A7 ... 6.45

## STRUCTURALS

**Carbon Steel Std. Shapes**
AlabamaCity,Ala. R2 ... 5.275
Atlanta A11 ... 5.475
Aliquippa,Pa. J5 ... 5.275
Bessemer,Ala. T2 ... 5.275
Bethlehem,Pa. B2 ... 5.325
Birmingham C15 ... 5.275
Clairton,Pa. U5 ... 5.275
Fairfield,Ala. T2 ... 5.275
Fontana,Calif. K1 ... 6.075
Gary,Ind. U5 ... 5.275
Geneva,Utah C11 ... 5.275
Houston S5 ... 5.375
Ind.Harbor,Ind. I-2 ... 5.275
Johnstown,Pa. B2 ... 5.325
Joliet,Ill. P22 ... 5.275
KansasCity,Mo. S5 ... 5.375
Lackawanna,N.Y. B2 ... 5.325
LosAngeles B3 ... 5.975
Minnequa,Colo. C10 ... 5.575
Munhall,Pa. U5 ... 5.275
Niles,Calif. P1 ... 5.925
Phoenixville,Pa. P4 ... 5.325
Portland,Oreg. O4 ... 6.025
Seattle B3 ... 6.025
S.Chicago,Ill. U5 W14 ... 5.275
S.SanFrancisco B3 ... 5.925
Sterling,Ill. N15 ... 5.275
Torrance,Calif. C11 ... 5.975
Weirton,W.Va. W6 ... 5.275

**Wide Flange**
Bethlehem,Pa. B2 ... 5.325
Clairton,Pa. U5 ... 5.275
Fontana,Calif. K1 ... 6.225
IndianaHarbor,Ind. I-2 ... 5.275
Lackawanna,N.Y. B2 ... 5.325
Munhall,Pa. U5 ... 5.275
Phoenixville,Pa. P4 ... 5.325
S.Chicago,Ill. U5 ... 5.275
Weirton,W.Va. W6 ... 5.275

**Alloy Std. Shapes**
Aliquippa,Pa. J5 ... 6.55
Clairton,Pa. U5 ... 6.55
Gary,Ind. U5 ... 6.55
Houston S5 ... 6.65
KansasCity,Mo. S5 ... 6.65
Munhall,Pa. U5 ... 6.55
S.Chicago,Ill. U5 ... 6.55

**H.S., L.A. Std. Shapes**
Aliquippa,Pa. J5 ... 7.75
Bessemer,Ala. T2 ... 7.75
Bethlehem,Pa. B2 ... 7.80
Clairton,Pa. U5 ... 7.75
Fairfield,Ala. T2 ... 7.75
Fontana,Calif. K1 ... 8.55
Gary,Ind. U5 ... 7.75
Geneva,Utah C11 ... 7.75
Houston S5 ... 7.85
Ind.Harbor,Ind. I-2, Y1 ... 7.75
Johnstown,Pa. B2 ... 7.80
KansasCity,Mo. S5 ... 7.85
Lackawanna,N.Y. B2 ... 7.80
LosAngeles B3 ... 8.45
Munhall,Pa. U5 ... 7.75
Seattle B3 ... 8.50
S.Chicago,Ill. U5, W14 ... 7.75
S.SanFrancisco B3 ... 8.40
Struthers,O. Y1 ... 7.75

**H.S., L.A. Wide Flange**
Bethlehem,Pa. B2 ... 7.80
Lackawanna,N.Y. B2 ... 7.80
Munhall,Pa. U5 ... 7.75
S.Chicago,Ill. U5 ... 7.75

## PILING

**BEARING PILES**
Bethlehem,Pa. B2 ... 5.325
Lackawanna,N.Y. B2 ... 5.325
Munhall,Pa. U5 ... 5.275
S.Chicago,Ill. U5 ... 5.275

**STEEL SHEET PILING**
Lackawanna,N.Y. B2 ... 6.225
Munhall,Pa. U5 ... 6.225
S.Chicago,Ill. U5 ... 6.225
Weirton,W.Va. W6 ... 6.225

## PLATES

**PLATES, Carbon Steel**
AlabamaCity, Ala. R2 ... 5.10
Aliquippa,Pa. J5 ... 5.10
Ashland,Ky.(15) A10 ... 5.10
Atlanta A11 ... 5.30
Bessemer,Ala. T2 ... 5.10
Clairton,Pa. U5 ... 5.10
Claymont,Del. C22 ... 5.10
Cleveland J5, R2 ... 5.20
Coatesville,Pa. L7 ... 5.10
Conshohocken,Pa. A3 ... 5.20
Ecorse,Mich. G5 ... 5.20
Fairfield,Ala. T2 ... 5.10
Fontana,Calif.(30) K1 ... 5.90
Gary,Ind. U5 ... 5.10
Geneva,Utah C11 ... 5.10
GraniteCity,Ill. G4 ... 5.30
Harrisburg,Pa. P1 ... 5.10
Houston S5 ... 5.20
Ind.Harbor,Ind. I-2, Y1 ... 5.10
Johnstown,Pa. B2 ... 5.10
Lackawanna,N.Y. B2 ... 5.10
LoneStar,Tex. L6 ... 5.20
Mansfield,O. E6 ... 5.10
Minnequa,Colo. C10 ... 5.95
Munhall,Pa. U5 ... 5.10
Newport,Ky. A2 ... 5.10
Pittsburgh J5 ... 5.10
Riverdale,Ill. A1 ... 5.10
Seattle B3 ... 6.00
Sharon,Pa. S3 ... 5.10
S.Chicago,Ill. U5, W14 ... 5.10
SparrowsPoint,Md. B2 ... 5.10
Sterling,Ill. N15 ... 5.10
Steubenville,O. W10 ... 5.10
Warren,O. R2 ... 5.10
Youngstown U5, Y1 ... 5.10

**PLATES, Carbon Abras. Resist.**
Claymont,Del. C22 ... 6.75
Fontana,Calif. K1 ... 7.55
Geneva,Utah C11 ... 6.75
Houston S5 ... 6.85
Johnstown,Pa. B2 ... 6.75
SparrowsPoint,Md. B2 ... 6.75

**PLATES, Wrought Iron**
Economy,Pa. B14 ... 13.15

**PLATES, H.S., L.A.**
Aliquippa,Pa. J5 ... 7.625
Bessemer,Ala. T2 ... 7.625
Clairton,Pa. U5 ... 7.625
Claymont,Del. C22 ... 7.625
Cleveland J5, R2 ... 7.625
Coatesville,Pa. L7 ... 7.625
Conshohocken,Pa. A3 ... 7.625
Economy,Pa. B14 ... 7.625
Ecorse,Mich. G5 ... 7.725
Fairfield,Ala. T2 ... 7.625
Farrell,Pa. S3 ... 7.625
Fontana,Calif.(30) K1 ... 8.425
Gary,Ind. U5 ... 7.625
Geneva,Utah C11 ... 7.625
Houston S5 ... 7.725
Ind.Harbor,Ind. I-2, Y1 ... 7.625
Johnstown,Pa. B2 ... 7.625
Munhall,Pa. U5 ... 7.625
Pittsburgh J5 ... 7.625
Seattle B3 ... 8.525
Sharon,Pa. S3 ... 7.625
S.Chicago,Ill. U5, W14 ... 7.625
SparrowsPoint,Md. B2 ... 7.625
Warren,O. R2 ... 7.625
Youngstown U5 ... 7.625

**PLATES, ALLOY**
Aliquippa,Pa. J5 ... 7.20
Claymont,Del. C22 ... 7.20
Coatesville,Pa. L7 ... 7.20
Economy,Pa. B14 ... 7.20
Fontana,Calif. K1 ... 8.00
Gary,Ind. U5 ... 7.20
Houston S5 ... 7.30
Ind.Harbor,Ind. Y1 ... 7.20
Johnstown,Pa. B2 ... 7.20
Lowellville,O. S3 ... 7.20
Munhall,Pa. U5 ... 7.20
Newport,Ky. A2 ... 7.20
Pittsburgh J5 ... 7.20
Seattle B3 ... 8.10
Sharon,Pa. S3 ... 7.20
S.Chicago,Ill. U5, W14 ... 7.20
SparrowsPoint,Md. B2 ... 7.20
Youngstown Y1 ... 7.20

**FLOOR PLATES**
Cleveland J5 ... 6.175
Conshohocken,Pa. A3 ... 6.175
Ind.Harbor,Ind. I-2 ... 6.175
Munhall,Pa. U5 ... 6.175
S.Chicago,Ill. U5 ... 6.175

**PLATES, Ingot Iron**
Ashland c.l.(15) A10 ... 5.35
Ashland l.c.l.(15) A10 ... 5.85
Cleveland c.l. R2 ... 5.85
Warren,O. c.l. R2 ... 5.85

## BARS

**BARS, Hot-Rolled Carbon (Merchant Quality)**
Ala.City,Ala.(9) R2 ... 5.425
Aliquippa,Pa.(9) J5 ... 5.425
Alton,Ill. L1 ... 5.625
Atlanta(9) A11 ... 5.625
Bessemer,Ala.(9) T2 ... 5.425
Birmingham(9) C15 ... 5.425
Buffalo(9) R2 ... 5.425
Clairton,Pa.(9) U5 ... 5.425
Cleveland (9) R2 ... 5.425
Ecorse,Mich.(9) G5 ... 5.525
Emeryville,Calif. J7 ... 6.175
Fairfield,Ala.(9) T2 ... 5.425
Fairless,Pa.(9) U5 ... 5.575
Fontana,Calif.(9) K1 ... 6.125
Gary,Ind.(9) U5 ... 5.425
Houston(9) S5 ... 5.675
Ind.Harbor(9) I-2, Y1 ... 5.425
Johnstown,Pa.(9) B2 ... 5.425
Joliet,Ill. P22 ... 5.425
KansasCity,Mo.(9) S5 ... 5.675
Lackawanna(9) B2 ... 5.425
LosAngeles(9) B3 ... 6.125
Midland,Pa.(23) C18 ... 5.725
Milton,Pa. M18 ... 5.575
Minnequa,Colo. C10 ... 5.875
Niles,Calif. P1 ... 6.125
N.Tonawanda,N.Y.(23) B11 ... 5.775
Owensboro,Ky.(9) G8 ... 5.425
Pittsburgh(9) J5 ... 5.425
Portland,Oreg. O4 ... 6.175
Seattle B3, N14 ... 6.175
S.Ch'c'go(9) R2, U5, W14 ... 5.425
S.Duquesne,Pa.(9) U5 ... 5.425
S.SanFran.,Calif.(9) B3 ... 6.175
Sterling,Ill.(1)(9) N15 ... 5.425
Sterling,Ill.(9) N15 ... 5.525
Struthers,O.(9) Y1 ... 5.425
Tonawanda,N.Y. B12 ... 5.425
Torrance,Calif.(9) C11 ... 6.125
Youngstown(9) R2, U5 ... 5.425

**BARS, H.R. Leaded Alloy (Including leaded extra)**
Warren,O. C17 ... 7.475

**BARS, Hot-Rolled Alloy**
Aliquippa,Pa. J5 ... 6.475
Bethlehem,Pa. B2 ... 6.475
Bridgeport,Conn. C32 ... 6.55
Buffalo R2 ... 6.475
Canton,O. R2, T7 ... 6.475
Clairton,Pa. U5 ... 6.475
Detroit S41 ... 6.475
Economy,Pa. B14 ... 6.475
Ecorse,Mich. G5 ... 6.575
Fairless,Pa. U5 ... 6.625
Farrell,Pa. S3 ... 6.475
Fontana,Calif. K1 ... 7.525
Gary,Ind. U5 ... 6.475
Houston S5 ... 6.725
Ind.Harbor,Ind. I-2, Y1 ... 6.475
Johnstown,Pa. B2 ... 6.475
KansasCity,Mo. S5 ... 6.725
Lackawanna,N.Y. B2 ... 6.475
Lowellville,O. S3 ... 6.475
LosAngeles B3 ... 7.525
Massillon,O. R2 ... 6.475
Midland,Pa. C18 ... 6.475
Owensboro,Ky. G8 ... 6.475
Pittsburgh J5 ... 6.475
Sharon,Pa. S3 ... 6.475
S.Chicago R2, U5, W14 ... 6.475
S.Duquesne,Pa. U5 ... 6.475
Struthers,O. Y1 ... 6.475
Warren,O. C17 ... 6.475
Youngstown U5 ... 6.475

**BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy**
Aliquippa,Pa. J5 ... 7.925
Bessemer,Ala. T2 ... 7.925
Bethlehem,Pa. B2 ... 7.925
Clairton,Pa. U5 ... 7.925
Cleveland R2 ... 7.925
Ecorse,Mich. G5 ... 8.025
Fairfield,Ala. T2 ... 7.925
Fontana,Calif. K1 ... 8.625
Gary,Ind. U5 ... 7.925
Houston S5 ... 8.175
Ind.Harbor,Ind. Y1 ... 7.925
Johnstown,Pa. B2 ... 7.925
KansasCity,Mo. S5 ... 8.175
Lackawanna,N.Y. B2 ... 7.925
LosAngeles B3 ... 8.625
Pittsburgh J5 ... 7.925
Seattle B3 ... 8.675
S.Chicago,Ill. U5, W14 ... 7.925
S.Duquesne,Pa. U5 ... 7.925
S.SanFrancisco B3 ... 8.675
Struthers,O. Y1 ... 7.925
Youngstown U5 ... 7.925

**BAR SIZE ANGLES; H.R. Carbon**
Bethlehem,Pa. (9) B2 ... 5.575
Houston(9) S5 ... 5.675
KansasCity,Mo.(9) S5 ... 5.675
Lackawanna(9) B2 ... 5.425
Sterling,Ill. N15 ... 5.525
Sterling,Ill.(1) N15 ... 5.425
Tonawanda,N.Y. B12 ... 5.425

**BAR SIZE ANGLES; S. Shapes**
Aliquippa,Pa. J5 ... 5.425
Atlanta A11 ... 5.625
Joliet,Ill. P22 ... 5.425
Niles,Calif. P1 ... 6.125
Pittsburgh J5 ... 5.425
Portland,Oreg. O4 ... 6.175
SanFrancisco S7 ... 6.275
Seattle B3 ... 6.175

**BAR SHAPES, Hot-Rolled Alloy**
Aliquippa,Pa. J5 ... 6.55
Clairton,Pa. U5 ... 6.55
Gary,Ind. U5 ... 6.55
Houston S5 ... 6.80
KansasCity,Mo. S5 ... 6.80
Pittsburgh J5 ... 6.55
Youngstown U5 ... 6.55

**BARS, C.F., Leaded Alloy (Including leaded extra)**
Ambridge,Pa. W18 ... 9.925
BeaverFalls,Pa. M12 ... 9.925
Camden,N.J. P13 ... 10.10
Chicago W18 ... 9.925
Cleveland C20 ... 9.925*
Elyria,O. W8 ... 9.925
LosAngeles P2, S30 ... 11.40*
Monaca,Pa. S17 ... 9.925
Newark,N.J. W18 ... 10.10
SpringCity,Pa. K3 ... 10.10
Warren,O. C17 ... 9.925

*Grade A; add 0.50c for Grade B.

**BARS, Cold-Finished Carbon**
Ambridge,Pa. W18 ... 7.30
BeaverFalls,Pa. M12,R2 ... 7.30
Birmingham C15 ... 7.90
Buffalo B5 ... 7.35
Camden,N.J. P13 ... 7.75
Carnegie,Pa. C12 ... 7.30
Chicago W18 ... 7.30
Cleveland A7, C20 ... 7.30
Detroit B5, P17 ... 7.50
Detroit S41 ... 7.30
Donora,Pa. A7 ... 7.30
Elyria,O. W8 ... 7.30
FranklinPark,Ill. N5 ... 7.30
Gary,Ind. R2 ... 7.30
GreenBay,Wis. F7 ... 7.30
Hammond,Ind. J5, L2 ... 7.30
Hartford,Conn. R2 ... 7.80
Harvey,Ill. B5 ... 7.30
LosAngeles(49) S30 ... 8.75
LosAngeles P2, R2 ... 8.75
Mansfield,Mass. B5 ... 7.85
Massillon,O. R2, R8 ... 7.30
Midland,Pa. C18 ... 7.30
Monaca,Pa. S17 ... 7.30
Newark,N.J. W18 ... 7.75
NewCastle,Pa.(17) B4 ... 7.30
Pittsburgh J5 ... 7.30
Plymouth,Mich.P5 ... 7.55
Putnam,Conn. W18 ... 7.85
Readville,Mass. C14 ... 7.85
S.Chicago,Ill. W14 ... 7.30
SpringCity,Pa. K3 ... 7.75
Struthers,O. Y1 ... 7.30
Warren,O. C17 ... 7.30
Willimantic,Conn. J5 ... 7.80
Waukegan,Ill. A7 ... 7.30
Youngstown F3, Y1 ... 7.30

**BARS, Cold-Finished Carbon (Turned and Ground)**
Cumberland,Md.(5) C19 ... 6.55

**BARS, Cold-Finished Alloy**
Ambridge,Pa. W18 ... 8.775
BeaverFalls,Pa. M12,R2 ... 8.775
Bethlehem,Pa. B2 ... 8.775
Bridgeport,Conn. C32 ... 8.925
Buffalo B5 ... 8.775
Camden,N.J. P13 ... 8.95
Canton,O. T7 ... 8.775
Carnegie,Pa. C12 ... 8.775
Chicago W18 ... 8.775
Cleveland A7, C20 ... 8.775
Detroit B5, P17 ... 8.975
Detroit S41 ... 8.775
Donora,Pa. A7 ... 8.775
Elyria,O. W8 ... 8.775
FranklinPark,Ill. N5 ... 8.775
Gary,Ind. R2 ... 8.775
GreenBay,Wis. F7 ... 8.775
Hammond,Ind. J5, L2 ... 8.775
Hartford,Conn. R2 ... 9.075
Harvey,Ill. B5 ... 8.775
Lackawanna,N.Y. B2 ... 8.775
LosAngeles P2, S30 ... 10.75
Mansfield,Mass. B5 ... 9.075
Massillon,O. R2, R8 ... 8.775
Midland,Pa. C18 ... 8.775
Monaca,Pa. S17 ... 8.775
Newark,N.J. W18 ... 8.95
Plymouth,Mich. P5 ... 8.975
S.Chicago,Ill. W14 ... 8.775
SpringCity,Pa. K3 ... 8.95
Struthers,O. Y1 ... 8.775
Warren,O. C17 ... 8.775
Waukegan,Ill. A7 ... 8.775
Willimantic,Conn. J5 ... 9.075
Worcester,Mass. A7 ... 9.075
Youngstown F3, Y1 ... 8.775

**BARS, Reinforcing (To Fabricators)**

AlabamaCity,Ala. R2 ..5.425
Atlanta A11 .....5.425
Birmingham C15 .....5.425
Buffalo R2 .....5.425
Cleveland R2 .....5.425
Ecorse,Mich. G5 .....5.775
Emeryville,Calif. J7 ...6.175
Fairfield,Ala. T2 .....5.425
Fairless,Pa. U5 .....5.575
Fontana,Calif. K1 .....6.125
Ft.Worth,Tex.(4)(26)T4 5.875
Gary,Ind. U5 .....5.425
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1 5.425
Johnstown,Pa. B2 ....5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo. S5 ...5.675
Kokomo,Ind. C16 .....5.525
Lackawanna,N.Y. B2 ..5.425
LosAngeles B3 .....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo. C10 ...5.875
Niles,Calif. P1 .....6.125
Pittsburg,Calif. C11 ...6.125
Pittsburgh J5 .....5.425
Portland,Oreg. O4 ....6.175
SandSprings,Okla. S5 ..5.925
Seattle B3 N14 .....6.175
S.Chicago,Ill. R2 .....5.425
S.Duquesne,Pa. U5 ....5.425
S.SanFrancisco B3 ....6.175
SparrowsPoint,Md. B2..5.425
Sterling,Ill.(1) N15 ...5.425
Sterling,Ill. N15 .....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ..6.00
Torrance,Calif. C11 ...6.125
Youngstown R2, U5 ..5.425

**BARS, Reinforcing (Fabricated; to Consumers)**

Boston B2, U8 .....7.65
Chicago U8 .....6.91
Cleveland U8 .....6.89
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.08
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..6.85
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.55
Philadelphia U8 .....7.38
Pittsburgh J5, U8 .....7.10
SandSprings,Okla. S5 ...7.60
Seattle B3, N14 .....7.70
SparrowsPt.,Md. B2 ....7.08
St.Paul U8 .....7.92
Williamsport,Pa. S19 ..7.00

**BARS, Wrought Iron**

Economy,Pa.(S.R.)B14 14.45
Economy,Pa.(D.R.)B14 18.00
Economy(Staybolt)B14, 18.45

**RAIL STEEL BARS**

ChicagoHts.(3) C2, I-2 5.325
ChicagoHts.(4)(44) I-2 5.425
ChicagoHts.(4) C2 ....5.425
Ecorse,Mich. G5 .....7.375
Franklin,Pa.(3) F5 ...5.325
Franklin,Pa.(4) F5 ...5.425
JerseyShore,Pa.(3) J8 ..5.30
Marion,O.(3) P11 .....5.325
Tonawanda(3) B12 ...5.325
Tonawanda(4) B12 ....6.00
Williamsport,Pa.(3) S19..5.50

## SHEETS

**SHEETS, Hot-Rolled Steel (18 Gage and Heavier)**

AlabamaCity,Ala. R2 ..4.925
Allenport,Pa. P7 .....4.925
Ashland,Ky.(8) A10 ..4.925
Cleveland J5, R2 .....4.925
Conshohocken,Pa. A3 ..4.975
Detroit(8) M1 .....5.025
Ecorse,Mich. G5 .....5.025
Fairfield,Ala. T2 .....4.925
Fairless,Pa. U5 .....4.975
Fontana,Calif. K1 ....5.675
Gary,Ind. U5 .....4.925
Geneva,Utah C11 .....5.025
GraniteCity,Ill.(8) G4 ..5.125
Ind.Harbor,Ind. I-2, Y1 4.925
Irvin,Pa. U5 .....4.925
Lackawanna,N.Y. B2 ..4.925
Mansfield,O. E6 .....4.925
Munhall,Pa. U5 .....4.925
Newport,Ky.(8) A2 ...4.925
Niles,O. M21, S3 .....4.925
Pittsburg,Calif. C11 ...5.625
Pittsburgh J5 .....4.925
Portsmouth,O. P12 ....4.925
Riverdale,Ill. A1 .....4.925
Sharon,Pa. S3 .....4.925
S.Chicago,Ill. W14 ....4.925
SparrowsPoint,Md. B2..4.925
Steubenville,O. W10 ...4.925
Warren,O. R2 .....4.925
Weirton,W.Va. W6 ....4.925
Youngstown U5, Y1 ....4.925

**SHEETS, H.R. (19) Ga. & Lighter**

Niles,O. M21 .....6.05

**SHEETS, H.R. Alloy**

Gary,Ind. U5 .....8.10
Ind.Harbor,Ind. Y1 ....8.10
Irvin,Pa. U5 .....8.10
Munhall,Pa. U5 .....8.10
Newport,Ky. A2 .....8.10
Youngstown U5, Y1 ....8.10

**SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy**

Cleveland J5, R2 .....7.275
Conshohocken,Pa. A3 ..7.325
Ecorse,Mich. G5 .....7.375
Fairfield,Ala. T2 .....7.275
Fairless,Pa. U5 .....7.325
Farrell,Pa. S3 .....7.275
Fontana,Calif. K1 ....8.025
Gary,Ind. U5 .....7.275
Ind.Harbor,Ind. I-2, Y1 7.275
Irvin,Pa. U5 .....7.275
Lackawanna(35) B2 ..7.275
Munhall,Pa. U5 .....7.275
Pittsburgh J5 .....7.275
S.Chicago,Ill. U5, W14 7.275
Sharon,Pa. S3 .....7.275
SparrowsPoint(36) B2..7.275
Warren,O. R2 .....7.275
Weirton,W.Va. W6 ....7.275
Youngstown U5, Y1 ....7.275

**SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)**

Ashland,Ky.(8) A10 ..5.175
Cleveland R2 .....5.675
Warren,O. R2 .....5.675

**SHEETS, Cold-Rolled Ingot Iron**

Cleveland R2 .....6.80
Middletown,O. A10 ....6.55
Warren,O. R2 .....6.80

**SHEETS, Cold-Rolled Steel (Commercial Quality)**

AlabamaCity,Ala. R2 ..6.05
Allenport,Pa. P7 .....6.05
Cleveland J5, R2 .....6.05
Conshohocken,Pa. A3 ..6.10
Detroit M1 .....6.05
Ecorse,Mich. G5 .....6.15
Fairfield,Ala. T2 .....6.05
Fairless,Pa. U5 .....6.10
Follansbee,W.Va. F4 ...6.05
Fontana,Calif. K1 ....7.30
Gary,Ind. U5 .....6.05
GraniteCity,Ill. G4 ....6.25
Ind.Harbor,Ind. I-2, Y1 6.05
Irvin,Pa. U5 .....6.05
Lackawanna,N.Y. B2 ..6.05
Mansfield,O. E6 .....6.05
Middletown,O. A10 ....6.05
Newport,Ky. A2 .....6.05
Pittsburg,Calif. C11 ...7.00
Pittsburgh J5 .....6.05
Portsmouth,O. P12 ....6.05
SparrowsPoint,Md. B2 ..6.05
Steubenville,O. W10 ...6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 ....6.05
Yorkville,O. W10 .....6.05
Youngstown Y1 .....6.05

**SHEETS, Cold-Rolled, High-Strength, Low Alloy**

Cleveland J5, R2 .....8.975
Ecorse,Mich. G5 .....9.075
Fairless,Pa. U5 .....9.025
Fontana,Calif. K1 ....10.275
Gary,Ind. U5 .....8.975
IndianaHarbor,Ind. Y1..8.975
Irvin,Pa. U5 .....8.975
Lackawanna(37) B2 ..8.975
Pittsburgh J5 .....8.975
SparrowsPoint(38) B2..8.975
Warren,O. R2 .....8.975
Weirton,W.Va. W6 ....8.975
Youngstown Y1 .....8.975

**SHEETS, Culvert**

| | Cu Steel | Cu Fe |
|---|---|---|
| Ashland,Ky. A10 | 6.95 | 7.20 |
| Canton,O. R2 | 6.95 | 7.45 |
| Fairfield T2 | 6.95 | 7.20 |
| Gary,Ind. U5 | 6.95 | 7.20 |
| GraniteCity,Ill. G4 | 7.15 | ... |
| Ind.Harbor I-2 | 6.95 | 7.20 |
| Irvin,Pa. U5 | 6.95 | 7.20 |
| Kokomo,Ind. C16 | 7.05 | ... |
| MartinsFry. W10 | 6.95 | 7.20 |
| Pitts.,Calif. C11 | 7.70 | ... |
| Pittsburgh J5 | 6.95 | ... |
| SparrowsPt. B2 | 6.95 | ... |

**SHEETS, Culvert—Pure Iron**

Ind.Harbor,Ind. I-2 ....7.20

**SHEETS, Galvanized Steel Hot-Dipped**

AlabamaCity,Ala. R2 ..6.60‡
Ashland,Ky. A10 .....6.60†
Canton,O. R2 .....6.60‡
Dover,O. E6 .....6.60†
Fairfield,Ala. T2 .....6.60†
Gary,Ind. U5 .....6.60†
GraniteCity,Ill. G4 ....6.80*
Ind.Harbor,Ind. I-2 ....6.60†
Irvin,Pa. U5 .....6.60†
Kokomo,Ind. C16 .....6.70‡
MartinsFerry,O. W10 ..6.60*
Middletown,O. A10 ....6.60†
Pittsburg,Calif. C11 ...7.35*
Pittsburgh J5 .....6.60†
SparrowsPt.,Md. B2 ..6.60†
Warren,O. R2 .....6.60†
Weirton,W.Va. W6 ....6.60*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

**SHEETS, Well Casing**

Fontana,Calif. K1 ....7.175

**SHEETS, Galvanized High-Strength, Low-Alloy**

Irvin,Pa. U5 .....9.725
SparrowsPt.(39) B2 ...9.725

**SHEETS, Galvannealed Steel**

Canton,O. R2 .....7.00
Irvin,Pa. U5 .....7.00

**SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)**

Ashland,Ky. A10 .....6.85
Middletown,O. A10 ....6.85

**SHEETS, Electrogalvanized**

Cleveland(28) R2 .....7.425
Niles,O.(28) R2 .....7.425
Youngstown J5 .....7.275
Weirton,W.Va. W6 ....7.275

**SHEETS, Aluminum Coated**

Butler,Pa.A10 (type 1). 9.25
Butler,Pa. A10 (type 2). 9.35

**SHEETS, Enameling Iron**

Ashland,Ky. A10 .....6.625
Cleveland R2 .....6.625
Fairfield,Ala. T2 .....6.625
Gary,Ind. U5 .....6.625
GraniteCity,Ill. G4 ....6.825
Ind.Harbor,Ind. I-2, Y1 6.625
Irvin,Pa. U5 .....6.625
Middletown,O. A10 ....6.625
Niles,O. M21, S3 .....6.625
Youngstown Y1 .....6.625

**BLUED STOCK, 29 Gage**

Follansbee,W.Va. F4 ..8.65
Ind.Harbor,Ind. I-2 ...8.475
Yorkville,O. W10 .....8.475

**SHEETS, Long Terne, Steel (Commercial Quality)**

BeechBottom,W.Va.W10 7.00
Gary,Ind. U5 .....7.00
Mansfield,O. E6 .....7.00
Middletown,O. A10 .....7.00
Niles,O. M21, R2, S3...7.00
Weirton,W.Va. W6 .....7.00

**SHEETS, Long Terne, Ingot Iron**

Middletown,O. A10 .....7.40

## Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American-Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D3 Dearborn Div., Sharon Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Special Wire
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless Steel Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U.S. Steel Supply Div., U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

## STRIP

**STRIP, Hot-Rolled Carbon**

| | |
|---|---|
| Ala.City,Ala.(27) R2 | 4.925 |
| Allenport,Pa. P7 | 4.925 |
| Alton,Ill. L1 | 5.125 |
| Ashland,Ky.(8) A10 | 4.925 |
| Atlanta A11 | 4.925 |
| Bessemer,Ala. T2 | 4.925 |
| Birmingham C15 | 4.925 |
| Buffalo(27) R2 | 4.925 |
| Conshohocken,Pa. A3 | 4.975 |
| Detroit M1 | 5.025 |
| Ecorse,Mich. G5 | 5.025 |
| Fairfield,Ala. T2 | 4.925 |
| Fontana,Calif. K1 | 5.675 |
| Gary,Ind. U5 | 4.925 |
| Ind.Harbor,Ind. I-2, Y1 | 4.925 |
| Johnstown,Pa.(25) B2 | 4.925 |
| Lackaw'na,N.Y.(25) B2 | 4.925 |
| LosAngeles(25) B3 | 5.675 |
| Minnequa,Colo. C10 | 6.025 |
| Riverdale,Ill. A1 | 4.925 |
| SanFrancisco S7 | 6.35 |
| Seattle(25) B3 | 5.925 |
| Seattle N14 | 6.35 |
| Sharon,Pa. S3 | 4.925 |
| S.Chicago W14 | 4.925 |
| S.SanFrancisco(25) B3 | 5.675 |
| SparrowsPoint,Md. B2 | 4.925 |
| Sterling,Ill.(1) N15 | 4.925 |
| Sterling,Ill. N15 | 5.025 |
| Torrance,Calif. C11 | 5.675 |
| Warren,O. R2 | 4.925 |
| Weirton,W.Va. W6 | 4.925 |
| Youngstown U5 | 4.925 |

**STRIP, Hot-Rolled Alloy**

| | |
|---|---|
| Carnegie,Pa. S18 | 8.10 |
| Farrell,Pa. S3 | 8.10 |
| Gary,Ind. U5 | 8.10 |
| Houston S5 | 8.35 |
| Ind.Harbor,Ind. Y1 | 8.10 |
| KansasCity,Mo. S5 | 8.35 |
| LosAngeles B3 | 9.30 |
| Lowellville,O. S3 | 8.10 |
| Newport,Ky. A2 | 8.10 |
| Sharon,Pa. A2, S3 | 8.10 |
| S.Chicago,Ill. W14 | 8.10 |
| Youngstown U5, Y1 | 8.10 |

**STRIP, Hot-Rolled High-Strength, Low-Alloy**

| | |
|---|---|
| Bessemer,Ala. T2 | 7.325 |
| Conshohocken,Pa. A3 | 7.325 |
| Ecorse,Mich. G5 | 7.425 |
| Fairfield,Ala. T2 | 7.325 |
| Farrell,Pa. S3 | 7.325 |
| Gary,Ind. U5 | 7.325 |
| Ind.Harbor,Ind. I-2, Y1 | 7.325 |
| Lackawanna,N.Y. B2 | 7.325 |
| LosAngeles(25) B3 | 8.075 |
| Seattle(25) B3 | 8.325 |
| Sharon,Pa. S3 | 7.325 |
| S.Chicago,Ill. W14 | 7.325 |
| S.SanFrancisco(25) B3 | 8.075 |
| SparrowsPoint,Md. B2 | 7.325 |
| Warren,O. R2 | 7.325 |
| Weirton,W.Va. W6 | 7.325 |
| Youngstown U5, Y1 | 7.325 |

**STRIP, Hot-Rolled Ingot Iron**

| | |
|---|---|
| Ashland,Ky.(8) A10 | 5.175 |
| Warren,O. R2 | 5.675 |

**STRIP, Cold-Rolled Carbon**

| | |
|---|---|
| Anderson,Ind. G6 | 7.15 |
| Baltimore T6 | 7.15 |
| Boston T6 | 7.70 |
| Buffalo S10 | 7.15 |
| Cleveland A7, J5 | 7.15 |
| Conshohocken,Pa. A3 | 7.20 |
| Dearborn,Mich. D3 | 7.25 |
| Detroit D2, M1, P20 | 7.25 |
| Dover,O. G6 | 7.15 |
| Ecorse,Mich. G5 | 7.25 |
| Evanston,Ill. M22 | 7.25 |
| Follansbee,W.Va. F4 | 7.15 |
| Fontana,Calif. K1 | 9.00 |
| FranklinPark,Ill. T6 | 7.25 |
| Ind.Harbor,Ind. Y1 | 7.15 |
| Indianapolis J5 | 7.30 |
| LosAngeles J5 | 9.05 |
| LosAngeles C1 | 9.20 |
| NewBedford,Mass. R10 | 7.60 |
| NewBritain,Conn. S15 | 7.60 |
| NewCastle,Pa. B4, E5 | 7.15 |
| NewHaven,Conn. D2 | 7.60 |
| NewKensington,Pa. A6 | 7.15 |
| Pawtucket,R.I. B3 | 7.80 |
| Pawtucket,R.I. N8 | 7.70 |
| Philadelphia P24 | 7.70 |
| Pittsburgh J5 | 7.15 |
| Riverdale,Ill. A1 | 7.25 |
| Rome,N.Y.(32) R6 | 7.15 |
| Sharon,Pa. S3 | 7.15 |
| Trenton,N.J.(31) R5 | 8.60 |
| Wallingford,Conn. W2 | 7.60 |
| Warren,O. R2, T5 | 7.15 |
| Weirton,W.Va. W6 | 7.15 |
| Worcester,Mass. A7 | 7.70 |
| Youngstown J5, Y1 | 7.15 |

**STRIP, Cold-Rolled Alloy**

| | |
|---|---|
| Boston T6 | 15.40 |
| Carnegie,Pa. S18 | 15.05 |
| Cleveland A7 | 15.05 |
| Dover,O. G6 | 15.05 |
| Farrell,Pa. S3 | 15.05 |
| FranklinPark,Ill. T6 | 15.05 |
| Harrison,N.J. C18 | 15.05 |
| Indianapolis J5 | 15.20 |
| Lowellville,O. S3 | 15.05 |
| Pawtucket,R.I. N8 | 15.40 |
| Riverdale,Ill. A1 | 15.05 |
| Sharon,Pa. S3 | 15.05 |
| Worcester,Mass. A7 | 15.35 |
| Youngstown J5 | 15.05 |

**STRIP, Cold-Rolled High-Strength, Low-Alloy**

| | |
|---|---|
| Cleveland A7 | 10.45 |
| Dearborn,Mich. D3 | 10.60 |
| Dover,O. G6 | 10.45 |
| Ecorse,Mich. G5 | 10.60 |
| Farrell,Pa. S3 | 10.50 |
| Ind.Harbor,Ind. Y1 | 10.65 |
| Sharon,Pa. S3 | 10.50 |
| Warren,O. R2 | 10.45 |
| Weirton,W.Va. W6 | 10.50 |
| Youngstown Y1 | 10.65 |

**STRIP, Cold-Rolled Ingot Iron**

| | |
|---|---|
| Warren,O. R2 | 7.90 |

**STRIP, C.R. Electrogalvanized**

| | |
|---|---|
| Cleveland A7 | 7.15* |
| Dover,O. G6 | 7.15* |
| Evanston,Ill. M22 | 7.25* |
| Riverdale,Ill. A1 | 7.25* |
| Warren,O. B9, T5 | 7.15* |
| Worcester,Mass. A7 | 7.70* |
| Youngstown J5 | 7.15* |

*Plus galvanizing extras.

**STRIP, Galvanized (Continuous)**

| | |
|---|---|
| Sharon,Pa. S3 | 7.275 |

**TIGHT COOPERAGE HOOP**

| | |
|---|---|
| Atlanta A11 | 5.65 |
| Riverdale,Ill. A1 | 5.50* |
| Sharon,Pa. S3 | 5.35 |
| Youngstown U5 | 5.25 |

| STRIP, Cold-Finished Spring Steel (Annealed) | 0.26-0.40C | 0.41-0.60C | 0.61-0.80C | 0.81-1.05C | 1.06-1.35C |
|---|---|---|---|---|---|
| Baltimore T6 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Boston T6 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Bristol,Conn. W1 | ... | 10.70 | 12.90 | 16.10 | 19.30 |
| Carnegie,Pa. S18 | 8.95 | 10.40 | 12.60 | 15.60 | ... |
| Cleveland A7 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Dearborn,Mich. D3 | 9.05 | 10.50 | 12.70 | ... | ... |
| Detroit D2 | 9.05 | 10.50 | 12.70 | 15.70 | ... |
| Dover,O. G6 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Evanston,Ill. M22 | 8.95 | 10.40 | 12.60 | 15.60 | ... |
| Fostoria,O. S1 | 10.05 | 10.40 | 12.60 | 15.60 | ... |
| FranklinPark,Ill. T6 | 9.05 | 10.40 | 12.60 | 15.60 | 18.55 |
| Harrison,N.J. C18 | ... | ... | 12.90 | 16.10 | 19.30 |
| Indianapolis J5 | 9.10 | 10.55 | 12.60 | 15.60 | 18.55 |
| LosAngeles C1 | 11.15 | 12.60 | 14.80 | 17.80 | ... |
| LosAngeles J5 | 11.15 | 12.60 | 14.80 | ... | ... |
| NewBritain,Conn.(10) S15 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| NewCastle,Pa. B4, E5 | 8.95 | 10.40 | 12.60 | 15.60 | ... |
| NewHaven,Conn. D2 | 9.40 | 10.70 | 12.90 | 15.90 | ... |
| NewKensington,Pa. A6 | 8.95 | 10.40 | 12.60 | 15.60 | ... |
| NewYork W3 | ... | 10.70 | 12.90 | 16.10 | 19.30 |
| Pawtucket,R.I. N8 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Riverdale,Ill. A1 | 9.05 | 10.40 | 12.60 | 15.60 | 18.55 |
| Rome,N.Y.(32) R6 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Sharon,Pa. S3 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Trenton,N.J. R5 | ... | 10.70 | 12.90 | 16.10 | 19.30 |
| Wallingford,Conn. W2 | 9.40 | 10.70 | 12.90 | 15.90 | 18.75 |
| Warren,O. T5 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Worcester,Mass. A7, T6 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Youngstown J5 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |

| Spring Steel (Tempered) | Up to 0.80C | 0.81-1.05C | 1.06-1.35C |
|---|---|---|---|
| Bristol,Conn. W1 | 18.10 | 21.95 | 26.30 |
| Buffalo W12 | 18.10 | ... | ... |
| Fostoria,O. S1 | 18.30 | 22.15 | ... |
| FranklinPark,Ill. T6 | 18.45 | 22.30 | 26.65 |
| Harrison,N.J. C18 | 18.10 | 21.95 | 26.30 |
| New York W3 | 18.10 | 21.95 | 26.30 |
| Palmer,Mass. W12 | 18.10 | ... | ... |
| Trenton,N.J. R5 | 18.10 | 21.95 | 26.30 |
| Worcester,Mass. A7, T6 | 18.10 | 21.95 | 26.30 |
| Youngstown J5 | 18.45 | 22.30 | 26.65 |

## SILICON STEEL

| H.R. SHEETS(22 Ga., cut lengths) | Field | Armature | Electric | Motor | Dynamo |
|---|---|---|---|---|---|
| BeechBottom,W.Va. W10 | ... | ... | 11.80 | 12.90 | 13.95 |
| Mansfield,O. E6 | 9.625 | 11.10 | 11.80 | 12.90 | 13.95 |
| Newport,Ky. A2 | 9.625 | 11.10 | 11.80 | 12.90 | 13.95 |
| Niles,O. M21, S3 | 9.625 | 11.10 | 11.80 | 12.90 | ... |
| Vandergrift,Pa. U5 | ... | 11.10 | 11.80 | 12.90 | 13.95 |
| Warren,O. R2 | 9.625 | 11.10 | 11.80 | 12.90 | ... |
| Zanesville,O. A10 | ... | 11.10 | 11.80 | 12.90 | 13.95 |

| C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower) | Field | Armature | Electric | Motor | Dynamo |
|---|---|---|---|---|---|
| BeechBottom,W.Va. W10 | ... | 11.35 | 12.05 | 13.15 | 14.20 |
| Brackenridge,Pa. A4 | ... | ... | 12.05 | 13.15 | 14.20 |
| GraniteCity,Ill. G4 | 9.825* | 11.05* | 11.75* | 12.85* | ... |
| IndianaHarbor,Ind. I-2 | 9.625† | 10.85* | 11.55* | 12.65* | ... |
| Mansfield,O. E6 | 9.625* | 11.35 | 12.05 | 13.15 | 14.20 |
| Vandergrift,Pa. U5 | 9.625* | 11.35 | 12.05 | 13.15 | 14.20 |
| Warren,O. R2 | 9.625* | 11.35 | 12.05 | 13.15 | 14.20 |
| Zanesville,O. A10 | ... | 11.35† | 12.05 | 13.15 | 14.20 |
| | | | | | Stator |
| Vandergrift,Pa. U5 | ... | ... | ... | ... | 7.85 |

| H.R. SHEETS (22 Ga., cut lengths) | T-72 | T-65 | T-58 | T-52 |
|---|---|---|---|---|
| BeechBottom,W.Va. W10 | 15.00 | 15.55 | 16.05 | 17.10 |
| Vandergrift,Pa. U5 | 15.00 | 15.55 | 16.05 | 17.10 |
| Zanesville,O. A10 | 15.00 | 15.55 | 16.05 | 17.10 |

| C.R. COILS & CUT LENGTHS (22 Ga.) | Grain Oriented T-100 | T-90 | T-80 | T-73 | T-66 | T-72 |
|---|---|---|---|---|---|---|
| Brackenridge,Pa. A4 | ... | 17.60 | 19.20 | 19.70 | 20.20 | 15.25†† |
| Butler,Pa. A10 | ... | ... | 19.20 | 19.70 | 20.20 | ... |
| Vandergrift,Pa. U5 | 16.60 | 17.60 | 19.20 | 19.70 | 20.20 | 15.25** |
| Warren,O. R2 | ... | ... | ... | ... | ... | 15.25‡ |

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower. ††Coils only.

## TIN MILL PRODUCTS

| TIN PLATE, Electrolytic (Base Box) | 0.25 lb | 0.50 lb | 0.75 lb |
|---|---|---|---|
| Aliquippa,Pa. J5 | $8.75 | $9.00 | $9.40 |
| Fairfield,Ala. T2 | 8.85 | 9.10 | 9.50 |
| Fairless,Pa. U5 | 8.85 | 9.10 | 9.50 |
| Fontana,Calif. K1 | 9.50 | 9.75 | 10.15 |
| Gary,Ind. U5 | 8.75 | 9.00 | 9.40 |
| GraniteCity,Ill. G4 | 8.85 | 9.10 | 9.50 |
| IndianaHarbor,Ind. I-2, Y1 | 8.75 | 9.00 | 9.40 |
| Irvin,Pa. U5 | 8.75 | 9.00 | 9.40 |
| Niles,O. B2 | 8.75 | 9.00 | 9.40 |
| Pittsburg,Calif. C11 | 9.50 | 9.75 | 10.15 |
| SparrowsPoint,Md. B2 | 8.85 | 9.10 | 9.50 |
| Weirton,W.Va. W6 | 8.75 | 9.00 | 9.40 |
| Yorkville,O. W10 | 8.75 | 9.00 | 9.40 |

| ELECTROTIN (22-27 Gage, Dollars per 100 lb) | | | |
|---|---|---|---|
| Aliquippa,Pa. J5 | 7.725 | 7.925 | ... |
| Niles,O. R2 | 7.725 | 7.925 | 8.125 |

| TIN PLATE, American | 1.25 lb | 1.50 lb |
|---|---|---|
| Aliquippa,Pa. J5 | $10.05 | $10.30 |
| Fairfield,Ala. T2 | 10.15 | 10.40 |
| Fairless,Pa. U5 | 10.15 | 10.40 |
| Fontana,Calif. K1 | 10.80 | 11.05 |
| Gary,Ind. U5 | 10.05 | 10.30 |
| Ind.Harb. Y1 | 10.05 | 10.30 |
| Pitts.,Calif. C11 | 10.80 | 11.05 |
| Sp.Pt.,Md. B2 | 10.15 | 10.40 |
| Weirton,W.Va. W6 | 10.05 | 10.30 |
| Yorkville,O. W10 | 10.05 | 10.30 |

| BLACK PLATE (Base Box) | |
|---|---|
| Aliquippa,Pa. J5 | $7.85 |
| Fairfield,Ala. T2 | 7.95 |
| Fairless,Pa. U5 | 7.95 |
| Fontana,Calif. K1 | 8.60 |
| Gary,Ind. U5 | 7.85 |
| GraniteCity,Ill. G4 | 7.95 |
| Ind.Harbor,Ind. I-2, Y1 | 7.85 |
| Irvin,Pa. U5 | 7.85 |

| HOLLOWARE ENAMELING Black Plate (29 Gage) | |
|---|---|
| Aliquippa,Pa. J5 | $7.50 |
| Gary,Ind. U5 | 7.50 |
| GraniteCity,Ill. G4 | 7.60 |
| Ind.Harbor,Ind. Y1 | 7.50 |
| Irvin,Pa. U5 | 7.50 |
| Yorkville,O. W10 | 7.50 |

| MANUFACTURING TERNES (Special Coated, Base Box) | |
|---|---|
| Gary,Ind. U5 | $9.70 |
| Irvin,Pa. U5 | 9.70 |

| ROOFING SHORT TERNES (8 lb Coated, Base Box) | |
|---|---|
| Gary,Ind. U5 | $11.25 |

## WIRE

| WIRE, Manufacturers Bright, Low Carbon | |
|---|---|
| AlabamaCity,Ala. R2 | 7.65 |
| Aliquippa,Pa. J5 | 7.65 |
| Alton,Ill. L1 | 7.85 |
| Atlanta A11 | 7.65 |
| Bartonville,Ill. K4 | 7.75 |
| Buffalo W12 | 7.65 |
| Chicago W13 | 7.65 |
| Cleveland A7, C20 | 7.65 |
| Crawfordsville,Ind. MS | 7.75 |
| Donora,Pa. A7 | 7.65 |
| Duluth A7 | 7.65 |
| Fairfield,Ala. T2 | 7.65 |
| Fostoria,O.(24) S1 | 7.75 |
| Houston S5 | 7.90 |
| Jacksonville,Fla. MS | 8.00 |
| Johnstown,Pa. B2 | 7.65 |
| Joliet,Ill. A7 | 7.65 |
| KansasCity,Mo. S5 | 7.90 |
| Kokomo,Ind. C16 | 7.75 |
| LosAngeles B3 | 8.60 |
| Minnequa,Colo. C10 | 7.90 |
| Monessen,Pa. P7, P16 | 7.65 |
| N.Tonawanda,N.Y. B11 | 7.65 |
| Palmer,Mass. W12 | 7.95 |
| Pittsburg,Calif. C11 | 8.60 |
| Portsmouth,O. P12 | 7.65 |
| Rankin,Pa. A7 | 7.65 |
| S.Chicago,Ill. R2 | 7.65 |
| S.SanFrancisco C10 | 8.60 |
| SparrowsPoint,Md. B2 | 7.75 |
| Sterling,Ill.(1) N15 | 7.65 |
| Sterling,Ill. N15 | 7.75 |
| Struthers,O. Y1 | 7.65 |
| Waukegan,Ill. A7 | 7.65 |
| Worcester,Mass. A7 | 7.95 |

| WIRE, Gal'd., for ACSR | |
|---|---|
| Bartonville,Ill. K4 | 12.65 |
| Buffalo W12 | 12.65 |
| Cleveland A7 | 12.65 |
| Donora,Pa. A7 | 12.65 |
| Duluth A7 | 12.65 |
| Johnstown,Pa. B2 | 12.65 |
| Minnequa,Colo. C10 | 12.775 |
| Monessen,Pa. P7, P16 | 12.65 |
| Muncie,Ind. I-7 | 12.85 |
| NewHaven,Conn. A7 | 12.95 |
| Palmer,Mass. W12 | 12.95 |
| Pittsburg,Calif. C11 | 13.45 |
| Portsmouth,O. P12 | 12.65 |
| Roebling,N.J. R5 | 12.95 |
| SparrowsPt.,Md. B2 | 12.75 |
| Struthers,O. Y1 | 12.65 |
| Trenton,N.J. A7 | 12.95 |
| Waukegan,Ill. A7 | 12.65 |
| Worcester,Mass. A7 | 12.95 |

| WIRE, Upholstery Spring | |
|---|---|
| Aliquippa,Pa. J5 | 9.30 |
| Alton,Ill. L1 | 9.50 |
| Buffalo W12 | 9.30 |
| Cleveland A7 | 9.30 |
| Donora,Pa. A7 | 9.30 |
| Duluth A7 | 9.30 |
| Johnstown,Pa. B2 | 9.30 |
| KansasCity,Mo. S5 | 9.55 |
| LosAngeles B3 | 10.25 |
| Minnequa,Colo. C10 | 9.50 |
| Monessen,Pa. P7, P16 | 9.30 |
| NewHaven,Conn. A7 | 9.60 |
| Palmer,Mass. W12 | 9.60 |
| Pittsburg,Calif. C11 | 10.25 |
| Portsmouth,O. P12 | 9.30 |
| Roebling,N.J. R5 | 9.60 |
| S.Chicago,Ill. R2 | 9.30 |
| S.SanFrancisco C10 | 10.25 |
| SparrowsPt.,Md. B2 | 9.40 |
| Struthers,O. Y1 | 9.30 |
| Trenton,N.J. A7 | 9.60 |
| Waukegan,Ill. A7 | 9.30 |
| Worcester,Mass. A7, J4 | 9.60 |

| WIRE, Fine & Weaving(8" Coils) | |
|---|---|
| Alton,Ill. L1 | 15.80 |
| Bartonville,Ill. K4 | 15.70 |
| Buffalo W12 | 15.60 |
| Chicago W13 | 15.60 |
| Cleveland A7 | 15.60 |
| Crawfordsville,Ind. MS | 15.70 |
| Fostoria,O. S1 | 15.60 |
| Houston S5 | 15.85 |
| Jacksonville,Fla. MS | 15.95 |
| Johnstown,Pa. B2 | 15.60 |
| KansasCity,Mo. S5 | 15.85 |
| Kokomo,Ind. C16 | 15.60 |
| Minnequa,Colo. C10 | 15.85 |
| Monessen,Pa. P16 | 15.60 |
| Muncie,Ind. I-7 | 15.80 |
| Palmer,Mass. W12 | 15.90 |
| S.SanFrancisco C10 | 16.45 |
| Waukegan,Ill. A7 | 15.60 |
| Worcester,Mass. A7, T6 | 15.90 |

| ROPE WIRE | (A) |
|---|---|
| Bartonville,Ill. K4 | 12.75 |
| Buffalo W12 | 12.75 |
| Fostoria,O. S1 | 12.75 |
| Johnstown,Pa. B2 | 12.75 |
| Monessen,Pa. P7 | 12.75 |
| Muncie,Ind. I-7 | 12.95 |
| Palmer,Mass. W12 | 13.05 |
| Portsmouth,O. P12 | 12.75 |
| Roebling,N.J. R5 | 13.05 |
| SparrowsPt.,Md. B2 | 12.85 |
| Struthers,O. Y1 | 12.75 |
| Worcester,Mass. J4 | 13.05 |

(A) Plow and Mild Plow; add 0.25c per Improved Plow

**WIRE, Tire Bead**

| | Col. |
|---|---|
| Bartonville,Ill. K4 | 16.55 |
| Monessen,Pa. P16 | 16.55 |
| Roebling,N.J. R5 | 17.05 |

**WIRE, Cold-Rolled Flat**

| | |
|---|---|
| Anderson,Ind. G6 | 11.65 |
| Baltimore T6 | 11.95 |
| Boston T6 | 11.85 |
| Buffalo W12 | 11.65 |
| Chicago W13 | 11.75 |
| Cleveland A7 | 11.65 |
| Crawfordsville,Ind. M8 | 11.65 |
| Dover,O. G6 | 11.65 |
| Fostoria,O. S1 | 11.65 |
| FranklinPark,Ill. T6 | 11.75 |
| Kokomo,Ind. C16 | 11.65 |
| Massillon,O. R8 | 11.65 |
| Milwaukee C23 | 11.85 |
| Monessen,Pa. P7, P16 | 11.65 |
| Palmer,Mass. W12 | 11.95 |
| Pawtucket,R.I. N8 | 11.95 |
| Philadelphia P24 | 11.95 |
| Riverdale,Ill. A1 | 11.75 |
| Rome,N.Y. R6 | 11.65 |
| Sharon,Pa. S3 | 11.65 |
| Trenton,N.J. R5 | 11.95 |
| Warren,O. B9 | 11.65 |
| Worcester,Mass. A7, T6 | 11.95 |

**NAILS, Stock**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 173 |
| Aliquippa,Pa. J5 | 173 |
| Atlanta A11 | 175 |
| Bartonville,Ill. K4 | 175 |
| Chicago W13 | 173 |
| Cleveland A9 | 173 |
| Crawfordsville,Ind. M8 | 175 |
| Donora,Pa. A7 | 173 |
| Duluth A7 | 173 |
| Fairfield,Ala. T2 | 173 |
| Houston S5 | 178 |
| Jacksonville,Fla. M8 | 175 |
| Johnstown,Pa. B2 | 173 |
| Joliet,Ill. A7 | 173 |
| KansasCity,Mo. S5 | 175 |
| Kokomo,Ind. C16 | 175 |
| Minnequa,Colo. C10 | 175 |
| Monessen,Pa. P7 | 173 |
| Pittsburg,Calif. C11 | 192 |
| Rankin,Pa. A7 | 173 |
| S.Chicago,Ill. R2 | 173 |
| SparrowsPt.,Md. B2 | 175 |
| Sterling,Ill.(7) N15 | 175 |
| Worcester,Mass. A7 | 179 |

**(To Wholesalers; per cwt)**

Galveston,Tex. D7 ... $9.10

**NAILS, Cut (100 lb keg)**

**To Dealers (33)**

Conshohocken,Pa. A3 ... $9.80
Wheeling,W.Va. W10 ... 9.80

**POLISHED STAPLES**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 175 |
| Aliquippa,Pa. J5 | 175 |
| Atlanta A11 | 177 |
| Bartonville,Ill. K4 | 177 |
| Crawfordsville,Ind. M8 | 177 |
| Donora,Pa. A7 | 175 |
| Duluth A7 | 175 |
| Fairfield,Ala. T2 | 175 |
| Houston S5 | 180 |
| Jacksonville,Fla. M8 | 177 |
| Johnstown,Pa. B2 | 175 |
| Joliet,Ill. A7 | 175 |
| KansasCity,Mo. S5 | 180 |
| Kokomo,Ind. C16 | 177 |
| Minnequa,Colo. C10 | 180 |
| Pittsburg,Calif. C11 | 194 |
| Rankin,Pa. A7 | 175 |
| S.Chicago,Ill. R2 | 175 |
| SparrowsPt.,Md. B2 | 177 |
| Sterling,Ill.(7) N15 | 175 |
| Worcester,Mass. A7 | 181 |

**TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)**

| Coil No. 3150 | |
|---|---|
| AlabamaCity,Ala. R2 | $10.26 |
| Atlanta A11 | 10.36 |
| Bartonville,Ill. K4 | 10.36 |
| Buffalo W12 | 10.26 |
| Chicago W13 | 10.26 |
| Crawfordsville,Ind. M8 | 10.36 |
| Donora,Pa. A7 | 10.26 |
| Duluth A7 | 10.26 |
| Fairfield,Ala. T2 | 10.26 |
| Houston S5 | 10.51 |
| Jacksonville,Fla. M8 | 10.36 |
| Johnstown,Pa. B2 | 10.26 |
| Joliet,Ill. A7 | 10.26 |
| KansasCity,Mo. S5 | 10.51 |
| Kokomo,Ind. C16 | 10.36 |
| LosAngeles B3 | 11.06 |
| Minnequa,Colo. C10 | 10.51 |
| Pittsburg,Calif. C11 | 11.04 |
| S.Chicago,Ill. R2 | 10.26 |
| S.SanFrancisco C10 | 11.04 |
| SparrowsPt.,Md. B2 | 10.36 |
| Sterling,Ill. (37) N15 | 10.36 |

| Coil No. 6500 Stand. | |
|---|---|
| AlabamaCity,Ala. R2 | $10.60 |
| Atlanta A11 | 10.70 |
| Bartonville,Ill. K4 | 10.70 |
| Buffalo W12 | 10.60 |
| Chicago W13 | 10.60 |
| Crawfordsville,Ind. M8 | 10.70 |
| Donora,Pa. A7 | 10.60 |
| Duluth A7 | 10.60 |
| Fairfield,Ala. T2 | 10.60 |
| Houston S5 | 10.85 |
| Jacksonville,Fla. M8 | 10.70 |
| Johnstown,Pa. B2 | 10.60 |
| Joliet,Ill. A7 | 10.60 |
| KansasCity,Mo. S5 | 10.85 |
| Kokomo,Ind. C16 | 10.70 |
| LosAngeles B3 | 11.40 |
| Minnequa,Colo. C10 | 10.85 |
| Pittsburg,Calif. C11 | 11.40 |
| S.Chicago,Ill. R2 | 10.60 |
| S.SanFrancisco C10 | 11.40 |
| SparrowsPt.,Md. B2 | 10.70 |
| Sterling,Ill.(37) N15 | 10.70 |

| Coil No. 6500 Interim | |
|---|---|
| AlabamaCity,Ala. R2 | $10.65 |
| Atlanta A11 | 10.75 |
| Bartonville,Ill. K4 | 10.75 |
| Buffalo W12 | 10.65 |
| Chicago W13 | 10.65 |
| Crawfordsville,Ind. M8 | 10.75 |
| Donora,Pa. A7 | 10.65 |
| Duluth A7 | 10.65 |
| Fairfield,Ala. T2 | 10.65 |
| Houston S5 | 10.90 |
| Jacksonville,Fla. M8 | 10.75 |
| Johnstown,Pa. B2 | 10.65 |
| Joliet,Ill. A7 | 10.65 |
| KansasCity,Mo. S5 | 10.90 |
| Kokomo,Ind. C16 | 10.75 |
| LosAngeles B3 | 11.45 |
| Minnequa,Colo. C10 | 10.90 |
| Pittsburg,Calif. C11 | 11.45 |
| S.Chicago,Ill. R2 | 10.65 |
| S.SanFrancisco C10 | 11.45 |
| SparrowsPt.,Md. B2 | 10.75 |
| Sterling,Ill.(37) N15 | 10.75 |

**BALE TIES, Single Loop**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 212 |
| Atlanta A11 | 214 |
| Bartonville,Ill. K4 | 214 |
| Crawfordsville,Ind. M8 | 214 |
| Donora,Pa. A7 | 212 |
| Duluth A7 | 212 |
| Fairfield,Ala. T2 | 212 |
| Houston S5 | 217 |
| Jacksonville,Fla. M8 | 214 |
| Joliet,Ill. A7 | 212 |
| KansasCity,Mo. S5 | 217 |
| Kokomo,Ind. C16 | 214 |
| Minnequa,Colo. C10 | 217 |
| Pittsburg,Calif. C11 | 236 |
| S.SanFrancisco C10 | 236 |
| SparrowsPt.,Md. B2 | 214 |
| Sterling,Ill.(7) N15 | 214 |

**FENCE POSTS**

| | |
|---|---|
| Birmingham C15 | 172 |
| ChicagoHts.,Ill. C2, I-2 | 172 |
| Duluth A7 | 172 |
| Franklin,Pa. F5 | 172 |
| Huntington,W.Va. C15 | 172 |
| Johnstown,Pa. B2 | 172 |
| Marion,O. P11 | 172 |
| Minnequa,Colo. C10 | 177 |
| Sterling,Ill.(1) N15 | 172 |
| Tonawanda,N.Y. B12 | 174 |

**WIRE, Barbed**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 193** |
| Aliquippa,Pa. J5 | 190§ |
| Atlanta A11 | 198* |
| Bartonville,Ill. K4 | 198 |
| Crawfordsville,Ind. M8 | 198 |
| Donora,Pa. A7 | 193† |
| Duluth A7 | 193† |
| Fairfield,Ala. T2 | 193† |
| Houston S5 | 198** |
| Jacksonville,Fla. M8 | 198 |
| Johnstown,Pa. B2 | 196§ |
| Joliet,Ill. A7 | 193† |
| KansasCity,Mo. S5 | 198** |
| Kokomo,Ind. C16 | 195† |
| Minnequa,Colo. C10 | 198** |
| Monessen,Pa. P7 | 196§ |
| Pittsburg,Calif. C11 | 213† |
| Rankin,Pa. A7 | 193† |
| S.Chicago,Ill. R2 | 193** |
| S.SanFrancisco C10 | 213* |
| SparrowsPoint,Md. B2 | 198§ |
| Sterling,Ill.(7) N15 | 198†† |

**WOVEN FENCE, 9-15 Ga. Col.**

| | |
|---|---|
| Ala.City,Ala. R2 | 187** |
| Aliq'ppa,Pa.9-14½ga.J5 | 190§ |
| Atlanta A11 | 192* |
| Bartonville,Ill. K4 | 192 |
| Crawfordsville,Ind. M8 | 192 |
| Donora,Pa. A7 | 187† |
| Duluth A7 | 187† |
| Fairfield,Ala. T2 | 187† |
| Houston S5 | 192** |
| Jacksonville,Fla. M8 | 192 |
| Johnstown,Pa.(43) B2 | 190§ |
| Joliet,Ill. A7 | 187† |
| KansasCity,Mo. S5 | 192** |
| Kokomo,Ind. C16 | 189† |
| Minnequa,Colo. C10 | 192** |
| Pittsburg,Calif. C11 | 210† |
| Rankin,Pa. A7 | 187† |
| S.Chicago,Ill. R2 | 187** |
| Sterling,Ill.(7) N15 | 192†† |

| | An'ld Stone | Galv. Stone |
|---|---|---|
| **WIRE (16 gage)** | | |
| Ala.City,Ala.R2 | 17.15 | 18.70** |
| Aliq'ppa,Pa. J5 | 17.15 | 18.95 |
| Bartonville K4 | 17.25 | 19.05 |
| Cleveland A7 | 17.15 | .... |
| Crawf'dsville M8 | 17.25 | 19.05 |
| Fostoria,O. S1 | 17.65 | 19.20† |
| Houston S5 | 17.40 | 18.95** |
| Jacksonville M8 | 17.25 | 19.05 |
| Johnstown B2 | 17.15 | 18.95§ |
| Kan.City,Mo. S5 | 17.40 | .... |
| Kokomo C16 | 17.25 | 18.80† |
| Minnequa C10 | 17.40 | 18.95** |
| P'lm'r,Mass.W12 | 17.45 | 19.00† |
| Pitts.,Calif. C11 | 17.50 | 19.05† |
| SparrowsPt. B2 | 17.25 | 19.05§ |
| Sterling(37)N15 | 17.25 | 19.05†† |
| Waukegan A7 | 17.15 | 18.70† |
| Worcester A7 | 17.45 | .... |

**WIRE, Merchant Quality**

| (6 to 8 gage) | An'ld Galv. |
|---|---|
| Ala.City,Ala. R2 | 8.65 9.20** |
| Aliquippa J5 | 8.65 9.325§ |
| Atlanta(48) A11 | 8.75 9.425* |
| Bartonville(48) K4 | 8.75 9.425 |
| Buffalo W12 | 8.65 9.20† |
| Cleveland A7 | 8.65 .... |
| Crawfordsville M8 | 8.75 9.425 |
| Donora,Pa. A7 | 8.65 9.20† |
| Duluth A7 | 8.65 9.20† |
| Fairfield T2 | 8.65 9.20† |
| Houston(48) S5 | 8.90 9.45** |
| Jacks'ville,Fla. M8 | 8.75 9.425 |
| Johnstown,B2(48) | 8.65 9.325§ |
| Joliet,Ill. A7 | 8.65 9.20† |
| Kans.City(48) S5 | 8.90 9.45** |
| Kokomo C16 | 8.75 9.30† |
| LosAngeles B3 | 9.60 10.275§ |
| Minnequa C10 | 8.90 9.45** |
| Monessen P7(48) | 8.65 9.325§ |
| Palmer,Mass. W12 | 8.95 9.50† |
| Pitts.Calif. C11 | 9.60 10.15† |
| Rankin,Pa. A7 | 8.65 9.20† |
| S.Chicago R2 | 8.65 9.20** |
| S.SanFran. C10 | 9.60 10.15** |
| SparrowsPt.B2(48) | 8.75 9.425§ |
| Sterling(48) N15 | 8.90 9.575†† |
| Sterling(1) (48) | 8.80 9.475†† |
| Struthers,O. Y1 | 8.65 9.30† |
| Worcester,Mass.A7 | 8.95 9.50† |

Based on zinc price of: *13.50, †5c, **10c. ‡Less than 10c. ††10.50c. **Subject to zinc equalization extras.

## FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

**BOLTS**

**Carriage, Machine Bolts**

Full Size Body (cut thread)

½ in. and smaller:

| | |
|---|---|
| 6 in. and shorter | 49.0 |
| Longer than 6 in. | 39.0 |
| ⅝ in. thru 1 in.: | |
| 6 in. and shorter | 39.0 |
| Longer than 6 in. | 35.0 |
| 1⅛ in. and larger: | |
| All lengths | 35.0 |

Undersized Body (rolled thread)

½ in. and smaller:

| | |
|---|---|
| 6 in. and shorter | 49.0 |

**Carriage, Machine, Lag Bolts Hot Galvanized:**

½ in. and smaller:

| | |
|---|---|
| 6 in. and shorter | 29.0 |
| Longer than 6 in. | 15.0 |
| ⅝ in. and larger: | |
| All lengths | 12.0 |

**Lag Bolts** (all diam.)

| | |
|---|---|
| 6 in. and shorter | 49.0 |
| Longer than 6 in. | 39.0 |

**Plow and Tap Bolts**

½ in. and smaller by 6 in. and shorter | 49.0

Larger than ½ in. or longer than 6 in. | 39.0

**Blank Bolts** | 39.0

**Step, Elevator, Tire Bolts** 49.0

**Stove Bolts, Slotted:**

¼ to ¼ in. incl.:

| | |
|---|---|
| 3 in. and shorter | 55.0 |
| ⅝ to ½ in., inclusive | 55.0 |

**NUTS**

**Reg. & Heavy Square Nuts:**

| | |
|---|---|
| All sizes | 55.5 |

**Square Nuts, Reg. & Heavy, Hot Galvanized:**

| | |
|---|---|
| All sizes | 41.0 |

**Hex Nuts, Reg. & Heavy, Hot Pressed:**

| | |
|---|---|
| ¾ in. and smaller | 60.5 |
| ⅞ in. to 1 in., incl. | 55.5 |
| 1⅛ in. to 1½ in., incl. | 58.5 |
| 1⅝ in. and larger | 53.5 |

**Hex Nuts, Reg. & Heavy, Cold Punched:**

| | |
|---|---|
| ¾ in. and smaller | 60.5 |
| ⅞ in. to 1½ in., incl. | 55.5 |
| 1⅝ in. and larger | 53.5 |

**Hex Nuts, All Types, Hot Galvanized:**

| | |
|---|---|
| ¾ in. and smaller | 46.5 |
| ⅞ in. to 1 in., incl. | 41.5 |
| 1⅛ in. to 1½ in., incl. | 46.5 |

**Hex Nuts, Semifinished, Heavy (Incl. Slotted):**

| | |
|---|---|
| ¾ in. and smaller | 60.5 |
| ⅞ in. to 1½ in., incl. | 55.5 |
| 1⅝ in. and larger | 53.5 |

**Hex Nuts, Finished (Incl. Slotted and Castellated):**

| | |
|---|---|
| 1 in. and smaller | 63.0 |
| 1⅛ in. to 1½ in., incl. | 59.0 |
| 1⅝ in. and larger | 53.5 |

**Semifinished Hex Nuts, Reg. (Incl. Slotted):**

| | |
|---|---|
| ⅝ in. and smaller | 60.5 |
| ¾ in. to 1 in., incl. | 63.0 |
| 1⅛ to 1½ in., incl. | 59.0 |
| 1⅝ in. and larger | 53.5 |

**CAP AND SETSCREWS**

(Base discounts, packages, per cent off list, f.o.b. mill)

**Hex Head Capscrews, Coarse or Fine Thread, Bright:**

6 in. and shorter:

| | |
|---|---|
| ¼ in. and smaller | 40.0 |
| ⅜ in. and 1 in. diam. | 22.0 |

Longer than 6 in.:

| | |
|---|---|
| ⅝ in. and smaller | 8.0 |
| ¾ in. and 1 in. diam. | + 6.0 |

**High Carbon, Heat Treated:**

6 in. and shorter:

| | |
|---|---|
| ⅝ in. and smaller | 26.0 |
| ¾ in. to 1 in. diam. | 3.0 |

Longer than 6 in.:

| | |
|---|---|
| ⅝ in. and smaller | + 13.0 |
| ¾ in. to 1 in. diam. | + 32.0 |

**Flat Head Capscrews:**

⅝ in. and smaller | + 76.0

**Setscrews, Square Head, Cup Point, Coarse Thread:**

Through 1 in. diam.:

| | |
|---|---|
| 6 in. and shorter | Net |
| Longer than 6 in. | + 23 |

## RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ⅞ in. larger 12.25

½ in. under: List less 19%

## BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

| O.D. In. | B.W. Gage | Seamless H.R. | Seamless C.D. | Elec. Weld H.R. |
|---|---|---|---|---|
| 1 | 13 | .... | 25.98 | 23.54 |
| 1¼ | 13 | .... | 30.78 | 23.36 |
| 1½ | 13 | 29.03 | 34.01 | 25.83 |
| 1⅝ | 13 | 34.29 | 40.18 | 30.51 |
| 2 | 13 | 38.44 | 45.05 | 34.20 |
| 2¼ | 13 | 43.29 | 50.75 | 38.52 |
| 2½ | 12 | 46.99 | 55.06 | 41.81 |
| 2⅝ | 12 | 51.76 | 60.65 | 46.05 |
| 2¾ | 12 | 56.04 | 65.67 | 49.88 |
| 3 | 12 | 59.76 | 70.03 | 53.19 |

## RAILWAY MATERIALS

| | Standard No. 1 | Standard No. 2 | Tee Rails All | Tee Rails 60-lb No. 2 Under |
|---|---|---|---|---|
| **Rails** | | | | |
| Bessemer,Pa. U5 | 5.525 | 5.425 | .... | 6.50 |
| Ensley,Ala. T2 | 5.525 | 5.425 | .... | 6.50 |
| Fairfield,Ala. T2 | .... | .... | .... | 6.50 |
| Gary,Ind. U5 | 5.525 | 5.425 | .... | .... |
| Huntington,W.Va. C15 | .... | .... | .... | 6.50 |
| IndianaHarbor,Ind. I-2 | 5.525 | 5.425 | 5.475 | .... |
| Johnstown,Pa. B2 | .... | .... | .... | (16)6.50 |
| Lackawanna,N.Y. B2 | 5.525 | 5.425 | .... | 6.50 |
| Minnequa,Colo. C10 | 5.525 | 5.425 | .... | 7.00 |
| Steelton,Pa. B2 | 5.525 | 5.425 | .... | .... |
| Williamsport,Pa. S19 | .... | .... | .... | 6.50 |

**TIE PLATES**

| | |
|---|---|
| Fairfield,Ala. T2 | 6.60 |
| Gary,Ind. U5 | 6.60 |
| Ind.Harbor,Ind. I-2 | 6.60 |
| Lackawanna,N.Y. B2 | 6.60 |
| Minnequa,Colo. C10 | 6.60 |
| Seattle B3 | 6.75 |
| Steelton,Pa. B2 | 6.60 |
| Torrance,Calif. C11 | 6.75 |

**JOINT BARS**

| | |
|---|---|
| Bessemer,Pa. U5 | 6.975 |
| Fairfield,Ala. T2 | 6.975 |
| Ind.Harbor,Ind. I-2 | 6.975 |
| Joliet,Ill. U5 | 6.975 |
| Lackawanna,N.Y. B2 | 6.975 |
| Minnequa,Colo. C10 | 6.975 |
| Steelton,Pa. B2 | 6.975 |

**AXLES**

| | |
|---|---|
| Ind.Harbor,Ind. S13 | 8.775 |
| Johnstown,Pa. B2 | 8.775 |

**TRACK BOLTS, Untreated**

| | |
|---|---|
| Cleveland R2 | 14.75 |
| KansasCity,Mo. S5 | 14.75 |
| Lebanon,Pa. B2 | 14.75 |
| Minnequa,Colo. C10 | 14.75 |
| Pittsburgh P14 | 14.75 |
| Seattle B3 | 15.25 |

**SCREW SPIKES**

| | |
|---|---|
| Lebanon,Pa. B2 | 14.50 |

**STANDARD TRACK SPIKES**

| | |
|---|---|
| Fairfield,Ala. T2 | 9.75 |
| Ind.Harbor,Ind. I-2, Y1 | 9.75 |
| KansasCity,Mo. S5 | 9.75 |
| Lebanon,Pa. B2 | 9.75 |
| Minnequa,Colo. C10 | 9.75 |
| Pittsburgh J5 | 9.75 |
| Seattle B3 | 10.25 |
| S.Chicago,Ill. R2 | 9.75 |
| Struthers,O. Y1 | 9.75 |
| Youngstown R2 | 9.75 |

## Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¾ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.15c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.60c, for width ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 9.30c, over 3½ in. and other shapes.

## SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| Size—Inches | ⅛ | | ¼ | | ⅜ | | ½ | | ¾ | | 1 | | 1¼ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 37c | | 58.5c | | 76.5c | | 92c | | $1.09 | | $1.48 | | $1.92 | |
| Pounds Per Ft | 0.68 | | 0.82 | | 0.62 | | 0.20 | | 10.89 | | 14.81 | | 19.18 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | +9.25 | +24.25 | +2.75 | +19.5 | +0.25 | +17 | 1.25 | +15.5 | 1.25 | +15.5 | 1 | +15.75 | 3.5 | +13.25 |
| Ambridge, Pa. N2 | +9.25 | .... | +2.75 | .... | +0.25 | .... | 1.25 | .... | 1.25 | .... | 1 | .... | 3.5 | .... |
| Lorain, O. N3 | +9.25 | +24.25 | +2.75 | +19.5 | +0.25 | +17 | 1.25 | +15.5 | 1.25 | +15.5 | 1 | +15.75 | 3.5 | +13.25 |
| Youngstown Y1 | +9.25 | +24.25 | +2.75 | +19.5 | +0.25 | +17 | 1.25 | +15.5 | 1.25 | +15.5 | 1 | +15.75 | 3.5 | +13.25 |

## ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Youngstown B2 | +9.25 | +24.25 | +2.75 | +19.5 | +0.25 | +17 | 1.25 | +15.5 | 1.25 | +15.5 | 1 | +15.75 | 3.5 | +13.25 |

## BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| Size—Inches | ⅛ | | ¼ | | ⅜ | | ½ | | ¾ | | 1 | | 1¼ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 5.5c | | 6c | | 6c | | 8.5c | | 11.5c | | 17c | | 23c | |
| Pounds Per Ft | 0.24 | | 0.42 | | 0.57 | | 0.85 | | 1.13 | | 1.68 | | 2.28 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | .... | .... | .... | .... | .... | .... | 5.25 | +10 | 8.25 | +6 | 11.75 | +1.5 | 14.25 | +0.75 |
| Alton, Ill. L1 | .... | .... | .... | .... | .... | .... | 3.25 | +12 | 6.25 | +8 | 9.75 | +3.5 | 12.25 | +2.75 |
| Benwood, W. Va. W10 | 4.5 | +22 | +7.5 | +31 | +18 | +39.5 | 5.25 | +10 | 8.25 | +6 | 11.75 | +1.5 | 14.25 | +0.75 |
| Butler, Pa. F6 | 5.5 | +21 | +6.5 | +30 | +17 | +38.5 | .... | .... | .... | .... | .... | .... | .... | .... |
| Etna, Pa. N2 | .... | .... | .... | .... | .... | .... | 5.25 | +10 | 8.25 | +6 | 11.75 | +1.5 | 14.25 | +0.75 |
| Fairless, Pa. N3 | .... | .... | .... | .... | .... | .... | 3.25 | +12 | 6.25 | +8 | 9.75 | +3.5 | 12.25 | +2.75 |
| Fontana, Calif. K1 | .... | .... | .... | .... | .... | .... | +8.25 | +23.5 | +5.25 | +19.5 | +1.75 | +15 | 0.75 | +14.25 |
| Indiana Harbor, Ind. Y1 | .... | .... | .... | .... | .... | .... | 4.25 | +11 | 7.25 | +7 | 10.75 | +2.5 | 13.25 | +3.25 |
| Lorain, O. N3 | .... | .... | .... | .... | .... | .... | 5.25 | +10 | 8.25 | +6 | 11.75 | +1.5 | 14.25 | +0.75 |
| Sharon, Pa. S1 | 5.5 | +21 | +6.5 | +30 | +17 | +38.5 | .... | .... | .... | .... | .... | .... | .... | .... |
| Sharon, Pa. M6 | .... | .... | .... | .... | .... | .... | 5.25 | +10 | 8.25 | +6 | 11.75 | +1.5 | 14.25 | +0.75 |
| Sparrows Pt., Md. B2 | 3.5 | +23 | +8.5 | +32 | +19 | +40.5 | 3.25 | +12 | 6.25 | +8 | 9.75 | +3.5 | 12.25 | +2.75 |
| Wheatland, Pa. W9 | 5.5 | +21 | +6 | +30 | +17 | +38.5 | 5.25 | +10 | 8.25 | +6 | 11.75 | +1.5 | 14.25 | +0.75 |
| Youngstown R2, Y1 | .... | .... | .... | .... | .... | .... | 5.25 | +10 | 8.25 | +6 | 11.75 | +1.5 | 14.25 | +0.75 |

| Size—Inches | 1½ | | 2 | | 2½ | | 3 | | 3½ | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 27.5c | | 37c | | 58.5c | | 76.5c | | 92c | | $1.09 | |
| Pounds Per Ft | 2.73 | | 3.68 | | 5.82 | | 7.62 | | 9.20 | | 10.89 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.5 | 16.75 | 0.5 | .... | .... | .... | .... |
| Alton, Ill. L1 | 12.75 | +1.75 | 13.25 | +1.25 | 14.75 | +1.5 | 14.75 | +1.5 | .... | .... | .... | .... |
| Benwood, W. Va. W10 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.5 | 16.75 | 0.5 | 6.25 | +10.5 | 6.25 | +10.5 |
| Etna, Pa. N2 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.5 | 16.75 | 0.5 | 6.25 | +10.5 | 6.25 | +10.5 |
| Fairless, Pa. N3 | 12.75 | +1.75 | 13.25 | +1.25 | 14.75 | +1.5 | 14.75 | +1.5 | 4.25 | +12.5 | 4.25 | +12.5 |
| Fontana, Calif. K1 | 1.25 | +13.25 | 1.75 | +12.75 | 3.25 | +13 | 3.25 | +13 | +7.25 | +24 | +7.25 | +24 |
| Indiana Harbor, Ind. Y1 | 13.75 | +0.75 | 14.25 | +0.25 | 15.75 | +0.5 | 15.25 | +0.5 | 5.25 | +11.5 | 5.25 | +11.5 |
| Lorain, O. N3 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.5 | 16.75 | 0.5 | .... | .... | .... | .... |
| Sharon, Pa. M6 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.5 | 16.75 | 0.5 | .... | .... | .... | .... |
| Sparrows Pt., Md. B2 | 12.75 | +1.75 | 13.25 | +1.25 | 14.75 | +1.5 | 14.75 | +1.5 | 4.25 | +12.5 | 4.25 | +12.5 |
| Wheatland, Pa. W9 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.5 | 16.75 | 0.5 | 6.25 | +10.5 | 6.25 | +10.5 |
| Youngstown R2, Y1 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.5 | 16.75 | 0.5 | 6.25 | +10.5 | 6.25 | +10.5 |

*Galvanized pipe discounts based on current price of zinc (10.00c, East St. Louis).

# Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

| AISI Type | —Rerolling— Ingot | Slabs | Forging Billets | H.R. Strip | H.R. Rods; C.F. Wire | Bars; Structural Shapes | Plates | Sheets | C.R. Strip; Flat Wire |
|---|---|---|---|---|---|---|---|---|---|
| 201 | 22.00 | 27.00 | .... | 36.00 | 40.00 | 42.00 | 44.25 | 48.50 | 45.00 |
| 202 | 23.75 | 30.25 | 36.50 | 39.00 | 40.75 | 43.00 | 45.00 | 49.25 | 49.25 |
| 301 | 23.25 | 28.00 | 37.25 | 37.25 | 42.00 | 44.25 | 46.25 | 51.25 | 47.50 |
| 302 | 25.25 | 31.50 | 38.00 | 40.50 | 42.75 | 45.00 | 47.25 | 52.00 | 52.00 |
| 302B | 25.50 | 32.75 | 40.75 | 45.75 | 45.00 | 47.25 | 49.50 | 57.00 | 57.00 |
| 303 | .... | 32.00 | 41.00 | 46.00 | 45.50 | 48.00 | 50.00 | 56.75 | 56.75 |
| 304 | 27.00 | 33.25 | 40.50 | 44.25 | 45.25 | 47.75 | 50.75 | 55.00 | 55.00 |
| 304L | .... | .... | 48.25 | 51.50 | 53.00 | 55.50 | 58.50 | 63.25 | 62.75 |
| 305 | 28.50 | 36.75 | 42.50 | 47.50 | 45.25 | 47.75 | 51.25 | 58.75 | 58.75 |
| 308 | 30.75 | 38.25 | 47.25 | 50.25 | 52.75 | 55.75 | 60.25 | 63.00 | 63.00 |
| 309 | 39.75 | 49.50 | 57.75 | 64.50 | 63.75 | 67.00 | 71.00 | 80.50 | 80.50 |
| 310 | 49.75 | 61.50 | 78.00 | 84.25 | 86.50 | 91.00 | 92.75 | 96.75 | 96.75 |
| 314 | .... | .... | 77.50 | .... | 86.50 | 91.00 | 92.75 | 99.00 | 104.25 |
| 316 | 39.75 | 49.50 | 62.25 | 69.25 | 69.25 | 73.00 | 76.75 | 80.75 | 80.75 |
| 316L | .... | 55.50 | 70.00 | 76.50 | 77.00 | 80.75 | 84.50 | 89.25 | 88.50 |
| 317 | 48.00 | 60.00 | 76.75 | 88.25 | 86.25 | 90.75 | 93.50 | 101.00 | 101.00 |
| 321 | 32.25 | 40.00 | 47.00 | 53.50 | 52.50 | 55.50 | 59.75 | 65.50 | 65.50 |
| 330 | .... | .... | 106.75 | .... | 95.25 | 106.75 | 105.50 | 108.00 | 149.25 |
| 18-8 CbTa | 37.00 | 46.50 | 55.75 | 63.50 | 61.50 | 64.75 | 69.75 | 79.25 | 79.25 |
| 403 | .... | .... | 32.00 | .... | 35.75 | 37.75 | 40.25 | 48.25 | 48.25 |
| 405 | 19.50 | 25.50 | 29.75 | 36.00 | 33.50 | 35.25 | 37.50 | 46.75 | 46.75 |
| 410 | 16.75 | 21.50 | 28.25 | 31.00 | 32.00 | 33.75 | 35.00 | 40.25 | 40.25 |
| 416 | .... | .... | 28.75 | .... | 32.50 | 34.25 | 36.00 | 48.25 | 48.25 |
| 420 | 26.00 | 33.50 | 34.25 | 41.75 | 39.25 | 41.25 | 45.25 | 52.00 | 62.00 |
| 430 | 17.00 | 21.75 | 28.75 | 32.00 | 32.50 | 34.25 | 36.00 | 40.75 | 40.75 |
| 430F | .... | .... | 29.50 | .... | 33.00 | 34.75 | 36.75 | 51.75 | 42.00 |
| 431 | .... | 28.75 | 37.75 | .... | 42.00 | 44.25 | 46.00 | 56.00 | 56.00 |
| 446 | .... | .... | 39.25 | 59.00 | 44.25 | 46.50 | 47.75 | 70.00 | 70.00 |

**Stainless Steel Producers Are:** Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless Steel Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels Inc.; U. S. Steel Corp.; Universal-Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel Co., subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.

# Clad Steel

| | Plates 5% | Plates Carbon Base 10% | Plates Carbon Base 15% | Plates Carbon Base 20% | Sheets Carbon Base 20% |
|---|---|---|---|---|---|
| Stainless | | | | | |
| 302 | .... | .... | .... | .... | 37.50 |
| 304 | 34.70 | 37.95 | 42.25 | 46.70 | 39.75 |
| 304L | 36.90 | 40.55 | 45.10 | 49.85 | .... |
| 316 | 40.35 | 44.50 | 49.50 | 54.50 | 58.25 |
| 316L | 45.05 | 49.35 | 54.70 | 60.10 | .... |
| 316 Cb | 47.30 | 53.80 | 61.45 | 69.10 | .... |
| 321 | 36.60 | 40.05 | 44.60 | 49.30 | 47.25 |
| 347 | 38.25 | 42.40 | 47.55 | 52.80 | 57.00 |
| 405 | 28.60 | 29.85 | 33.35 | 36.85 | .... |
| 410 | 28.15 | 29.55 | 33.10 | 36.70 | .... |
| 430 | 28.30 | 29.80 | 33.55 | 37.25 | .... |
| Inconel | 48.00 | 59.55 | 70.15 | 80.85 | .... |
| Nickel | 41.65 | 51.95 | 62.30 | 72.70 | .... |
| Nickel, Low Carbon | 41.95 | 52.60 | 63.30 | 74.15 | .... |
| Monel | 43.35 | 53.55 | 63.80 | 74.05 | .... |
| Copper* | .... | .... | .... | .... | 46.00 |

| | Strip, Carbon Base —Cold Rolled— 10% | Both Sides |
|---|---|---|
| Copper* | 33.10 | 38.75 |

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

# Tool Steel

| Grade | $ per lb | Grade | $ per lb |
|---|---|---|---|
| Regular Carbon | 0.305 | Cr-Hot Work | 0.475 |
| Extra Carbon | 0.360 | W-Cr Hot Work | 0.500 |
| Special Carbon | 0.475 | V-Cr Hot Work | 0.520 |
| Oil Hardening | 0.475 | Hi-Carbon-Cr | 0.925 |

| Grade by Analysis (%) W | Cr | V | Co | Mo | $ per lb |
|---|---|---|---|---|---|
| 20.25 | 4.25 | 1.6 | 12.25 | .... | 4.285 |
| 18.25 | 4.25 | 1 | 4.75 | .... | 2.500 |
| 18 | 4 | 2 | 9 | .... | 2.870 |
| 18 | 4 | 2 | .... | .... | 1.960 |
| 18 | 4 | 1 | .... | .... | 1.795 |
| 9 | 3.5 | .. | .... | .... | 1.395 |
| 13.5 | 4 | 3 | .... | .... | 2.060 |
| 13.75 | 3.75 | 2 | 5 | .... | 2.440 |
| 6.4 | 4.5 | 1.9 | .... | 5 | 1.300 |
| 6 | 4 | 3 | .... | 6 | 1.545 |
| 1.5 | 4 | 1 | .... | 8.5 | 1.155 |

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

# Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal transportation tax.

| | Basic | No. 2 Foundry | Malle-able | Besse-mer |
|---|---|---|---|---|
| *Birmingham District* | | | | |
| Birmingham R2 | 62.00 | 62.50‡ | .... | .... |
| Birmingham U6 | .... | 62.50‡ | 66.50 | .... |
| Woodward,Ala. W15 | 62.00** | 62.50‡ | 66.50 | .... |
| Cincinnati, deld. | .... | 70.20 | .... | .... |
| *Buffalo District* | | | | |
| Buffalo H1, R2 | 66.00 | 66.50 | 67.00 | 67.50 |
| N.Tonawanda,N.Y. T9 | .... | 66.50 | 67.00 | 67.50 |
| Tonawanda,N.Y. W12 | 66.00 | 66.50 | 67.00 | 67.50 |
| Boston, deld. | 77.29 | 77.79 | 78.29 | .... |
| Rochester,N.Y., deld. | 69.02 | 69.52 | 70.02 | .... |
| Syracuse,N.Y., deld. | 70.12 | 70.62 | 71.12 | .... |
| *Chicago District* | | | | |
| Chicago I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| S.Chicago,Ill. R2 | 66.00 | 66.50 | 66.50 | 67.00 |
| S.Chicago,Ill. W14 | 66.00 | .... | 66.50 | 67.00 |
| Milwaukee, deld. | 69.02 | 69.52 | 69.52 | 70.02 |
| Muskegon,Mich., deld. | .... | 74.52 | 74.52 | .... |
| *Cleveland District* | | | | |
| Cleveland R2, A7 | 66.00 | 66.50 | 66.50 | 67.00 |
| Akron,Ohio, deld. | 69.12 | 69.62 | 69.62 | 70.12 |
| *Mid-Atlantic District* | | | | |
| Birdsboro,Pa. B10 | 68.00 | 68.50 | 69.00 | 69.50 |
| Chester,Pa. P4 | 68.00 | 68.50 | 69.00 | .... |
| Swedeland,Pa. A3 | 68.00 | 68.50 | 69.00 | 69.50 |
| NewYork, deld. | .... | 75.50 | 76.00 | .... |
| Newark,N.J., deld. | 72.69 | 73.19 | 73.69 | 74.19 |
| Philadelphia, deld. | 70.41 | 70.91 | 71.41 | 71.99 |
| Troy,N.Y. R2 | 68.00 | 68.50 | 69.00 | 69.50 |
| *Pittsburgh District* | | | | |
| NevilleIsland,Pa. P6 | 66.00 | 66.50 | 66.50 | 67.00 |
| Pittsburgh (N&S sides), Aliquippa, deld. | .... | 67.95 | 67.95 | 68.48 |
| McKeesRocks,Pa., deld. | .... | 67.60 | 67.60 | 68.13 |
| Lawrenceville Homestead, Wilmerding,Monaca,Pa., deld. | .... | 68.26 | 68.26 | 68.79 |
| Verona,Trafford,Pa., deld. | 68.29 | 68.82 | 68.82 | 69.35 |
| Brackenridge,Pa., deld. | 68.60 | 69.10 | 69.10 | 69.63 |
| Midland,Pa. C18 | 66.00 | .... | .... | .... |
| *Youngstown District* | | | | |
| Hubbard,Ohio Y1 | .... | .... | 66.50 | .... |
| Sharpsville,Pa. S6 | 66.00 | .... | 66.50 | 67.00 |
| Youngstown Y1 | .... | .... | 66.50 | 67.00 |
| Mansfield,Ohio, deld. | 70.90 | .... | 71.40 | 71.90 |
| Duluth I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| Erie,Pa. I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| Everett,Mass. E1 | 67.50 | 68.00 | 68.50 | .... |
| Fontana,Calif. K1 | 75.00 | 75.50 | .... | .... |
| Geneva,Utah C11 | 66.00 | 66.50 | .... | .... |
| GraniteCity,Ill. G4 | 67.90 | 68.40 | 68.90 | .... |
| Ironton,Utah C11 | 66.00 | 66.50 | .... | .... |
| Minnequa,Colo. C10 | 68.00 | 68.50 | 69.00 | .... |
| Rockwood,Tenn. T3 | .... | 62.50‡ | 66.50 | .... |
| Toledo,Ohio I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| Cincinnati, deld. | 72.54 | 73.04 | .... | .... |

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.

## PIG IRON DIFFERENTIALS

*Silicon:* Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

*Manganese:* Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

*Nickel:* Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

## BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

| | |
|---|---|
| Jackson,Ohio I-3, J1 | $78.00 |
| Buffalo H1 | 79.25 |

## ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

| | |
|---|---|
| CalvertCity,Ky. P15 | $99.00 |
| NiagaraFalls,N.Y. P15 | 99.00 |
| Keokuk,Iowa Open-hearth & Fdry. $9 freight allowed K2 | 103.50 |
| Keokuk,Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2 | 106.50 |

## LOW PHOSPHORUS PIG IRON, Gross Ton

| | |
|---|---|
| Lyles,Tenn. T3 (Phos. 0.035% max) | $78.50 |
| Rockwood,Tenn. T3 (Phos. 0.035% max) | 78.50 |
| Troy,N.Y. R2 (Phos. 0.035% max) | 74.00 |
| Philadelphia, deld. | 82.67 |
| Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |
| Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |
| Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |
| NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |

# Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Chattanooga, Houston, Seattle, no charge.

| | SHEETS | | | | STRIP | BARS | | | Standard Structural Shapes | PLATES | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hot-Rolled | Cold-Rolled | Gal. 10 Ga.† | Stainless Type 302 | Hot-Rolled* | H.R. Rounds | C.F. Rds.‡ | H.R. Alloy 4140††§ | | Carbon | Floor |
| Atlanta | 8.59‖ | 9.86‖ | .... | .... | 8.64 | 9.01 | 10.68 | .... | 9.05 | 8.97 | 10.90 |
| Baltimore | 8.28 | 8.88 | 9.68 | .... | 8.76 | 9.06 | 11.34# | 15.18 | 9.19 | 8.66 | 10.14 |
| Birmingham | 8.18 | 9.45 | 11.07 | .... | 8.23 | 8.60 | 10.57 | .... | 8.64 | 8.56 | 10.70 |
| Boston | 9.38 | 10.44 | 11.45 | 53.50 | 9.42 | 9.73 | 12.90# | 15.28 | 9.63 | 9.72 | 11.20 |
| Buffalo | 8.40 | 9.00 | 10.07 | 55.98 | 8.50 | 8.80 | 10.90# | 15.00 | 8.90 | 8.90 | 10.45 |
| Chattanooga | 8.35 | 9.69 | 9.65 | .... | 8.40 | 8.77 | 10.46 | .... | 8.88 | 8.80 | 10.66 |
| Chicago | 8.20 | 9.45 | 10.10 | 53.00 | 8.23 | 8.60 | 8.80 | 14.65 | 8.64 | 8.56 | 9.88 |
| Cincinnati | 8.34 | 9.48 | 10.10 | 52.43 | 8.54 | 8.92 | 9.31 | 14.96 | 9.18 | 8.93 | 10.21 |
| Cleveland | 8.18 | 9.45 | 10.20 | 52.33 | 8.33 | 8.69 | 10.80# | 14.74 | 9.01 | 8.79 | 10.11 |
| Dallas | 7.50 | 8.80 | .... | .... | 7.65 | 7.60 | 11.01 | .... | 9.00 | 9.45 | 10.70 |
| Denver | 9.38 | 11.75 | .... | .... | 9.41 | 9.78 | 11.10 | .... | 7.65 | 8.45 | 9.70 |
| Detroit | 8.43 | 9.70 | 10.45 | 56.50 | 8.58 | 8.90 | 9.15 | 14.91 | 9.18 | 8.91 | 10.13 |
| Erie, Pa. | 8.20 | 9.45 | 9.95¶ | .... | 8.50 | 8.75 | 9.05¶ | .... | 9.00 | 8.85 | 10.10 |
| Houston | 7.10 | 8.40 | 8.45 | 54.32 | 7.25 | 7.20 | 11.10 | 13.50 | 7.25 | 8.05 | 9.30 |
| Jackson, Miss. | 8.52 | 9.79 | .... | .... | 8.57 | 8.94 | 10.68 | .... | 8.97 | 8.90 | 10.74 |
| Los Angeles | 9.60 | 9.40 | 11.70 | 57.60 | 8.55 | 8.70 | 12.00 | .... | 8.60 | 8.55 | 10.70 |
| Memphis, Tenn. | 8.55 | 9.80 | .... | .... | 8.60 | 8.97 | 11.96# | .... | 9.01 | 8.93 | 10.56 |
| Milwaukee | 8.33 | 9.58 | 10.23 | .... | 8.36 | 8.73 | 9.03 | 14.78 | 8.85 | 8.69 | 10.01 |
| Moline, Ill. | 8.55 | 9.80 | 10.45 | .... | 8.58 | 8.95 | 9.15 | .... | 8.99 | 8.91 | .... |
| New York | 8.87 | 10.13 | 10.56 | 53.08 | 9.31 | 9.57 | 12.76# | 15.09 | 9.35 | 9.43 | 10.71 |
| Norfolk, Va. | 8.40 | .... | .... | .... | 9.10 | 9.10 | 12.00 | .... | 9.40 | 8.85 | 10.35 |
| Philadelphia | 8.00 | 8.90 | 9.92 | 52.69 | 8.70 | 8.65 | 11.51# | 15.01 | 8.50 | 8.75 | 9.75** |
| Pittsburgh | 8.18 | 9.45 | 10.45 | 52.00 | 8.33 | 8.60 | 10.80# | 14.65 | 8.64 | 8.56 | 9.88 |
| Portland, Oreg. | 8.50 | 11.20 | 11.55 | 57.38 | 9.55 | 8.65 | 14.50 | 15.95 | 8.65 | 8.30 | 11.50 |
| Richmond, Va. | 8.40 | .... | 10.40 | .... | 9.10 | 9.00 | .... | .... | 9.40 | 8.85 | 10.35 |
| St. Louis | 8.54 | 9.79 | 10.46 | .... | 8.59 | 8.97 | 9.41 | 15.01 | 9.10 | 8.93 | 10.25 |
| St. Paul | 8.79 | 10.04 | 10.71 | .... | 8.84 | 9.21 | 9.66 | .... | 9.38 | 9.30 | 10.49 |
| San Francisco | 9.35 | 10.75 | 11.00 | 55.10 | 10.95 | 9.70 | 11.34# | 16.10 | 9.50 | 9.60 | 12.00 |
| Seattle | 9.95 | 11.15 | 12.20 | 57.38 | 10.00 | 10.10 | 14.05 | 16.35 | 9.80 | 9.70 | 12.10 |
| South'ton, Conn. | 9.07 | 10.33 | 10.71 | .... | 9.48* | 9.74 | .... | .... | 9.57 | 9.57 | 10.91 |
| Spokane | 9.95 | 11.15 | 12.00 | 57.38 | 10.00 | 10.10 | 14.05 | 17.20 | 9.80 | 9.70 | 12.10 |
| Washington | 8.88 | .... | .... | .... | 9.36 | 9.56 | 10.94 | .... | 9.79 | 9.26 | 10.74 |

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **¼ in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.; #1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, Portland, Oreg. 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Portland, Oreg., 1000 to 9999 lb; ³—400 to 9999 lb; ⁸—1000 to 1999 lb; ⁸—2000 to 3999 lb; ¹⁰—2000 lb and over.

# Refractories

**Fire Clay Brick (per 1000)**

*High-Heat Duty:* Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, Ohio, $138; Cutler, Utah, $165.

*Super-Duty:* Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

**Silica Brick (per 1000)**

*Standard:* Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., $150; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

*Super-Duty:* Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

**Semisilica Brick (per 1000)**

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N. J., $135.

**Ladle Brick (per 1000)**

*Dry Pressed:* Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

**High-Alumina Brick (per 1000)**

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Clearfield, Orviston, Snow Shoe, Pa., $305; Philadelphia, $310.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Clearfield, Orviston, Snow Shoe, Pa., $345; Philadelphia, $350.

**Sleeves (per 1000)**

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

**Nozzles (per 1000)**

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

**Runners (per 1000)**

Reesdale, Johnstown, Bridgeburg, Pa., $234.

**Dolomite (per net ton)**

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.

**Magnesite (per net ton)**

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

# Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective $CaF_2$ content 72.5%, $37-41; 70%, $36.40; 60%, $33-36.50. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $33-34; Mexican, all rail, duty paid, $25.25-25.75; barge, Brownsville, Tex., $27.25-27.75.

# Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

| | Cents |
|---|---|
| Sponge Iron, Swedish: Deld. east of Mississippi River, ocean bags 23,000 lb and over | 10.50 |
| F.o.b. Riverton or Camden, N. J., west of Mississippi River | 9.50 |
| Sponge Iron, Domestic, 98 + % Fe: Deld.east of Mississippi River, 23,000 lb and over | 10.50 |
| Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in. | 28.00 |
| Annealed, 99.5% Fe | 36.50 |
| Unannealed (99 + % Fe) | 36.00 |
| Unannealed (99 + % Fe) (minus 325 mesh) | 59.00 |
| Powder Flakes (minus 16, plus 100 mesh) | 29.00 |
| Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00 - 290.00 in standard 200-lb containers; all minus 200 mesh. | |

| | Dollars |
|---|---|
| Aluminum: Atomized, 500-lb drum, freight allowed Carlots | 39.50 |
| Ton lots | 41.50 |
| Antimony, 500-lb lots | 42.00* |
| Brass, 5000-lb lots | 30.30-45.70† |
| Bronze, 5000-lb lots | 45.70-49.80† |
| Copper: Electrolytic | 14.75* |
| Reduced | 14.75* |
| Lead | 7.50* |
| Manganese: Minus 35 mesh | 64.00 |
| Minus 100 mesh | 70.00 |
| Minus 200 mesh | 75.00 |
| Nickel, unannealed | 74.00 |
| Nickel-Silver, 5000-lb lots | 47.80-52.60† |
| Phosphor-Copper, 5000-lb lots | 57.80 |
| Copper (atomized) 5000-lb lots | 38.30-46.80† |
| Silicon | 47.50 |
| Solder | 7.00* |
| Stainless Steel, 304 | $1.07 |
| Stainless Steel, 316 | $1.26 |
| Tin | 14.50* |
| Zinc, 5000-lb lots | 17.50-30-70‡ |
| Tungsten: Melting grade, 99% 60 to 200 mesh, nominal; 1000 lb and over | 3.15 |
| Less than 1000 lb | 3.30 |
| Chromium, electrolytic 99.8% Cr min metallic basis | 5.00 |

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

# Electrodes

Threaded with nipple; unboxed, f.o.b. plant

**GRAPHITE**

| Inches Diam | Length | Per 100 lb |
|---|---|---|
| 2 | 24 | $60.75 |
| 2½ | 30 | 39.25 |
| 3 | 40 | 37.00 |
| 4 | 40 | 35.00 |
| 5⅛ | 40 | 34.75 |
| 6 | 60 | 31.50 |
| 7 | 60 | 28.25 |
| 8, 9, 10 | 60 | 28.00 |
| 12 | 72 | 26.75 |
| 14 | 60 | 26.75 |
| 16 | 72 | 25.75 |
| 17 | 60 | 26.25 |
| 18 | 72 | 26.25 |
| 20 | 72 | 25.25 |
| 24 | 84 | 26.00 |

**CARBON**

| | | |
|---|---|---|
| 8 | 60 | 13.30 |
| 10 | 60 | 13.00 |
| 12 | 60 | 12.95 |
| 14 | 60 | 12.85 |
| 14 | 72 | 11.95 |
| 17 | 60 | 11.85 |
| 17 | 72 | 11.40 |
| 20 | 84 | 11.40 |
| 20 | 90 | 11.00 |
| 24 | 72, 84 | 11.25 |
| 24 | 96 | 10.95 |
| 30 | 84 | 11.05 |
| 40, 35 | 110 | 10.70 |
| 40 | 100 | 10.70 |

# Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries.)

| | North Atlantic | South Atlantic | Gulf Coast | West Coast |
|---|---|---|---|---|
| Deformed Bars, Intermediate, ASTM-A 305 | $5.33 | $5.33 | $5.33 | $5.73 |
| Bar Size Angles | 5.73 | 5.58 | 5.58 | 5.99 |
| Structural Angles | 5.73 | 5.58 | 5.58 | 5.99 |
| I-Beams | 5.88 | 5.72 | 5.72 | 6.02 |
| Channels | 5.88 | 5.72 | 5.72 | 6.02 |
| Plates (basic bessemer) | 6.79 | 6.62 | 6.62 | 6.94 |
| Sheets, H.R. | 8.25 | 8.20 | 8.20 | 8.50 |
| Sheets, C.R. (drawing quality) | 9.00 | 8.95 | 8.95 | 9.25 |
| Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft | 25.71 | 25.59 | 25.59 | 26.46 |
| Barbed Wire (†) | 6.65 | 6.65 | 6.65 | 7.00 |
| Merchant Bars | 6.23 | 6.07 | 6.07 | 6.43 |
| Hot-Rolled Bands | 7.20 | 7.15 | 7.15 | 7.55 |
| Wire Rods, Thomas Commercial No. 5 | 6.73 | 6.73 | 6.73 | 7.13 |
| Wire Rods, O.H. Cold Heading Quality No. 5 | 7.07 | 7.07 | 7.07 | 7.47 |
| Bright Common Wire Nails ($) | 8.02 | 8.02 | 7.92 | 8.20 |

†Per 82 lb. net, reel. $Per 100-lb kegs, 20d nails and heavier.

# Ores

**Lake Superior Iron Ore**

(Prices effective for the 1958 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

| | |
|---|---|
| Mesabi bessemer | $11.60 |
| Mesabi nonbessemer | 11.45 |
| Old Range bessemer | 11.85 |
| Old Range nonbessemer | 11.70 |
| Open-hearth lump | 12.70 |
| High phos. | 11.45 |

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

**Eastern Local Iron Ore**

Cents per unit, deld. E. Pa.:

| | |
|---|---|
| New Jersey, foundry and basic 62-64% concentrates | 25.00-27.00 |

**Foreign Iron Ore**

Cents per unit, c.i.f. Atlantic ports

| | |
|---|---|
| Swedish basic, 65% | 25.00 |
| N. African hematite (spot) | nom. |
| Brazilian iron ore, 68-69% | 27.00 |

**Tungsten Ore**

Net ton, unit

| | |
|---|---|
| Foreign wolframite, good commercial quality | $11.80-12.00* |
| Domestic, concentrates f.o.b. milling points | 20.00 |

*Before duty.

**Manganese Ore**

Mn 46-48%, Indian (export tax included), $135 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; other than Indian, nominal; contracts by negotiation.

**Chrome Ore**

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

| | |
|---|---|
| *Indian and Rhodesian* | |
| 48% 3:1 | $50.00 |
| 48% 2.8:1 | 48.00 |
| 48% no ratio | 39.00 |
| *South African Transvaal* | |
| 48% no ratio | $37.00 |
| 44% no ratio | 27.00 |
| *Turkish* | |
| 48% 3:1 | $55.00 |
| *Domestic* Rail nearest seller | |
| 48% 3:1 | 39.00 |

**Molybdenum**

| | |
|---|---|
| Sulfide concentrate, per lb of Mo content, mines, unpacked | $1.18 |

**Antimony Ore**

| | |
|---|---|
| Per short ton unit of Sb content, c.i.f. seaboard | |
| 55-60% | $2.50-2.60 |
| 60-65% | 2.60-2.90 |

**Vanadium Ore**

Cents per lb $V_2O_5$

| | |
|---|---|
| Domestic | 31.00 |

# Metallurgical Coke

**Price per net ton**

**Beehive Ovens**

| | |
|---|---|
| Connellsville, Pa., furnace | $14.75-15.75 |
| Connellsville, Pa., foundry | 18.00-18.50 |

**Oven Foundry Coke**

| | |
|---|---|
| Birmingham, ovens | $28.85 |
| Cincinnati, deld. | 31.84 |
| Buffalo, ovens | 30.50 |
| Camden, N. J., ovens | 29.50 |
| Detroit, ovens | 30.50 |
| Pontiac, Mich., deld. | 32.45 |
| Saginaw, Mich., deld. | 34.03 |
| Erie, Pa., ovens | 30.50 |
| Everett, Mass., ovens: New England, deld. | 31.55* |
| Indianapolis, ovens | 29.75 |
| Ironton, Ohio, ovens | 29.00 |
| Cincinnati, deld. | 31.84 |
| Kearny, N. J., ovens | 29.75 |
| Milwaukee, ovens | 30.50 |
| Neville Island (Pittsburgh), Pa., ovens | 29.25 |
| Painesville, Ohio, ovens | 30.50 |
| Cleveland, deld. | 32.69 |
| Philadelphia, ovens | 29.50 |
| St. Louis, ovens | 31.50 |
| St. Paul, ovens | 29.75 |
| Chicago, deld. | 33.29 |
| Swedeland, Pa., ovens | 29.50 |
| Terre Haute, Ind., ovens | 29.75 |

*Or within $4.85 freight zone from works.

# Coal Chemicals

Spot, cents per gallon, ovens

| | |
|---|---|
| Pure benzene | 36.00 |
| Toluene, one deg | 29.50 |
| Industrial xylene | 32.00-34.00 |

Per ton, bulk, ovens

| | |
|---|---|
| Ammonium sulfate | $32.00-34.00 |

Cents per pound, producing point

Phenol: Grade 1, 17.50; Grade 2-3, 15.50; Grade 4, 17.50; Grade 5, 16.50; Grade 6, 14.50.

# Ferroalloys

## MANGANESE ALLOYS

**Spiegeleisen:** Carlot, per gross ton, Palmerton, Neville Island, Pa., 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

**Standard Ferromanganese:** (Mn 74-76%, C 7% approx.) Base price per net ton: $245, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively. (Mn 79-81%). Lump $253 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

**High-Grade Low-Carbon Ferromanganese:** (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.5% C, and 6.5c for max 7% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

**Medium-Carbon Ferromanganese:** (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

**Manganese Metal:** 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

**Electrolytic Manganese Metal:** Min carload, 34c; 2000 lb to min carload, 36c; less ton, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

**Silicomanganese:** (Mn 65-68%). Carload, lump, bulk 1.50% C grade, 18-20% Si, 12.5c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2% from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

## TITANINUM ALLOYS

**Ferrotitanium, Low-Carbon:** (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

**Ferrotitanium, High-Carbon:** (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis.

## CHROMIUM ALLOYS

**High-Carbon Ferrochrome:** Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

**Low-Carbon Ferrochrome:** Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Ton lot, add 3.5c; less ton, add 5.2c. Delivered.

Cr 67-71%, carload, lump, bulk, C 0.02% max, 41.00c per lb contained Cr; 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Ton lot, add 3.4c; less ton lot, add 5.1c. Delivered.

**Foundry Ferrochrome, High-Carbon:** (Cr 61-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in x D, bulk 30.05c per lb of contained Cr. Packed, c.l. 31.65c, ton 33.45c; less ton 34.95c. Delivered. Spot, add 0.25c.

**Foundry Ferrosilicon Chrome:** (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, SM x D, 21.25c per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot add 0.25c.

**Ferrochrome-Silicon:** Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" x down, 27.50c per lb contained Cr, 14.20c per lb contained Si, 0.75" x down, 28.65c per lb contained Cr, 14.20c per lb contained Si. Delivered.

**Chromium Metal, Electrolytic:** Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ¾" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

## VANADIUM ALLOYS

**Ferrovanadium:** Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

**Grainal:** Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

**Vanadium Oxide:** Contract less carload lot, packed, $1.38 per lb contained $V_2O_5$, freight allowed. Spot, add 5c.

## SILICON ALLOYS

**25-30% Ferrosilicon:** Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed $1.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

**50% Ferrosilicon:** Contract, carload, lump, bulk, 14.20c per lb of contained Si. Packed c.l. 16.70c, ton lot 18.15c, less ton 19.80c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

**Low-Aluminum 50% Ferrosilicon:** (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

**65% Ferrosilicon:** Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

**75% Ferrosilicon:** Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

**90% Ferrosilicon:** Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

**Silicon Metal:** (98% min Si, 0.75% max Fe, 0.07% max Ca), C.l. lump, bulk, 22.00c per lb of Si. Packed, c.l. 23.65c, ton lot 24.95c, less ton 25.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe-grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

**Alsifer:** (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

## ZIRCONIUM ALLOYS

**12-15% Zirconium Alloy:** (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

**35-40% Zirconium Alloy:** (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

## BORON ALLOYS

**Ferroboron:** (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

**Borosil:** (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

**Bortam:** (B 1.5-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

**Carbortam:** (B 1 to 2%). Contract, lump, carload 9.50c per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

## CALCIUM ALLOYS

**Calcium-Manganese-Silicon:** (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

**Calcium-Silicon:** (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

## BRIQUETTED ALLOYS

**Chromium Briquets:** (Weighing approx 3½ lb each and containing 2 lb of Cr). Contract, carload, bulk 19.60c per lb of briquet, carload packed in box pallets 19.80c, in bags 20.70c; 2000 lb to c.l. in box pallets 21.00c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

**Ferromanganese Briquets:** (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l. packed, pallets 15c, bags 16c; 3000 lb to c.l. pallets 16.2c; 2000 lb to c.l. bags, 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

**Silicomanganese Briquets:** (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c. 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

**Silicon Briquets:** (Large size—weighing approx 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.7c per lb of briquet; packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l., bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c. (Small size—weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l., pallets 9.65c; 2000 lb to c.l., bags, 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

**Molybdic-Oxide Briquets:** (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

## TUNGSTEN ALLOYS

**Ferrotungsten:** (70-80%), 5000 lb W or more $2.15, per lb (nominal) of contained W. Delivered.

## OTHER FERROALLOYS

**Ferrocolumbium:** (Cb 50-60%, Si 8% max, C 0.4% max). Ton lots 2" x D, $4 per lb of contained Cb; less ton lots, $4.05 (nominal). Delivered.

**Ferrotantalum Columbium:** (Cb 40% approx Ta 20% approx, and ¼Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $3.80 per lb of contained Cb plus Ta, delivered; less ton lot $3.85 (nominal).

**SMZ Alloy:** (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, c.l. packed ½-in x 12 M 20.00c per lb of alloy, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

**Graphidox No. 5:** (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

**V-5 Foundry Alloy:** (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.50c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

**Simanal:** (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

**Ferrophosphorus:** (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $110 per gross ton.

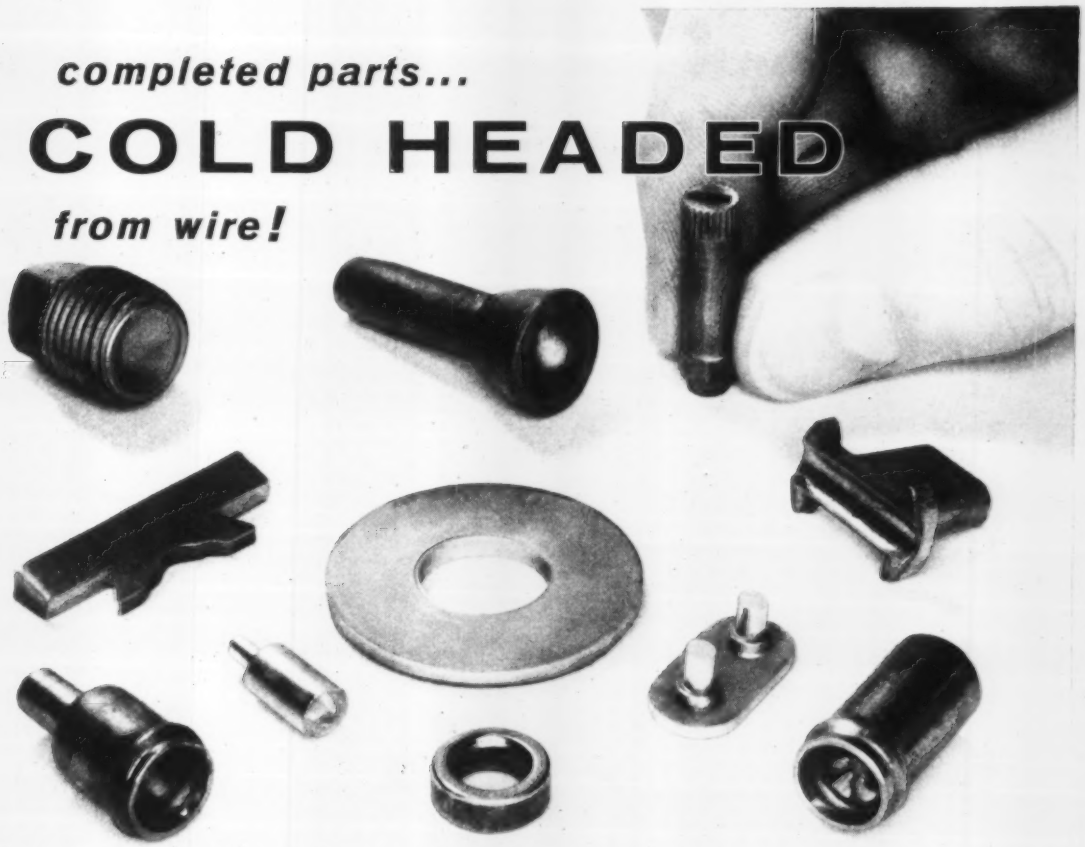
**Ferromolybdenum:** (55-75%). Per lb of contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa. $1.68 in all sizes except powdered which is $1.74.

**Technical Molybdic-Oxide:** Per lb of contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.

*completed parts...*

# COLD HEADED

*from wire!*



Top row, left to right: pipe plug, ball seat for push-rod end, splined square-head shaft. Middle row: commutator bar, solenoid contact, wire clamp. Bottom row: distributor cap insert, transistor case, spacer, link, distributor cap center wire insert.

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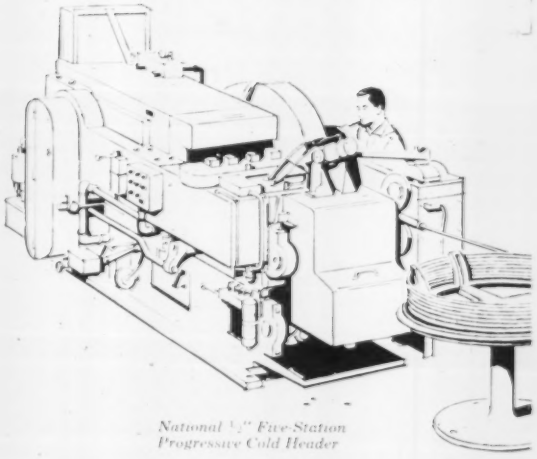

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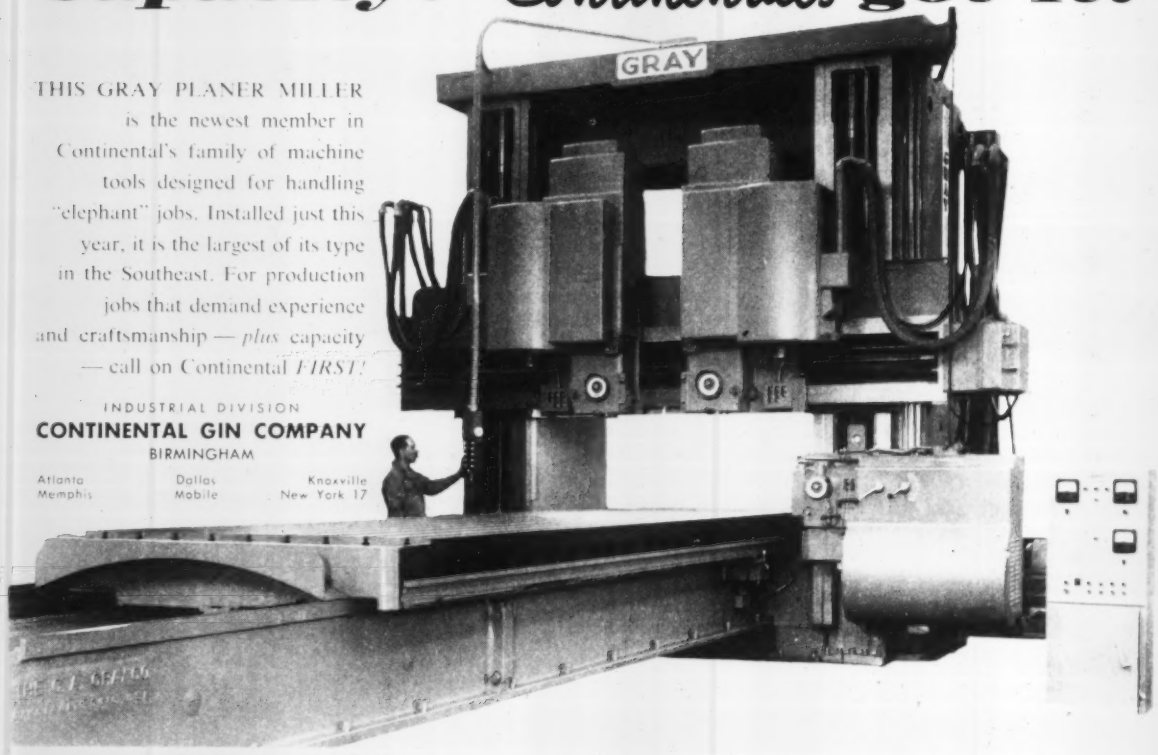


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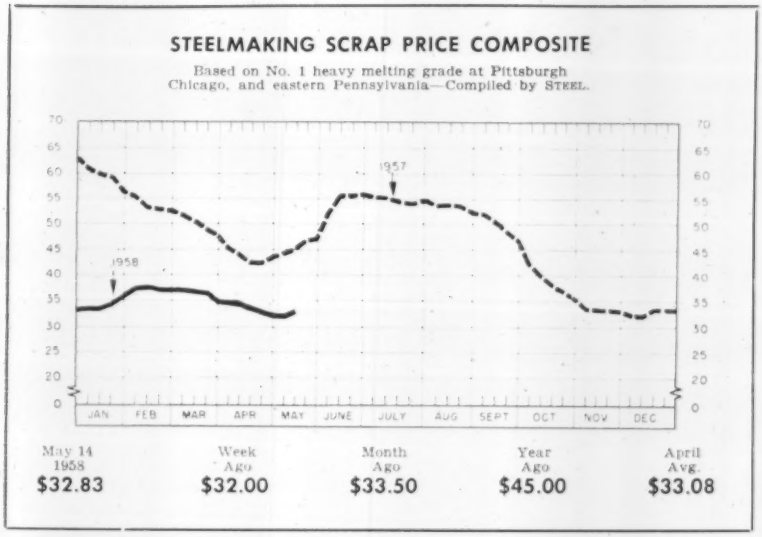

STEELMAKING SCRAP PRICE COMPOSITE
Based on No. 1 heavy melting grade at Pittsburgh Chicago, and eastern Pennsylvania—Compiled by STEEL.
1957
1958
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
May 14 1958 $32.83
Week Ago $32.00
Month Ago $33.50
Year Ago $45.00
April Avg. $33.08

# Scrap Market Continues To Gain Strength

## STEEL's composite on No. 1 heavy melting rises 83 cents to $32.83 as Chicago again moves higher. New business is confined to scattered light sales

Scrap Prices, Page 218

**Chicago**—Scrap prices advanced another $1 to $2 a ton last week. The upsurge cannot be attributed to improved steel demand, although the district operating rate increased 2½ points to 57 per cent of capacity. It is the highest rate since mid-March.

Consumers are buying at the higher prices, but in such small tonnages that the transactions have only a minor effect on the market. Mill inventories are ample, and the supply of melting material is far above needs. Collection and yard activities are slow.

**Pittsburgh**—Dealers are more reluctant to sell scrap at current prices than they have been in many weeks. They're selling only when hard pressed for cash or cramped for space. Says a local broker: "We had to call a lot more people than usual to cover our bundle orders." Encouraged by better steelmaking operations and reports of higher prices in the Chicago area, dealers are hoping for a better market.

The big mills aren't buying, so there's little support for the feeling that prices will move much higher. On railroad lists, No. 1 heavy melting brought $1 more, specialties $1 less than previously.

**Philadelphia** — The scrap market has stabilized here on light buying. On the May list of the Pennsylvania Railroad, 5000 tons of No. 1 heavy railroad scrap brought $35.75, or about $1 a ton over the previous opening.

With completion of the loading of two cargoes for export, the outlook for dock shipments in June is for lower tonnage than recorded this month.

**New York**—Iron and steel scrap prices are unchanged here. The market appears to be fairly well stabilized at present levels, although buying by eastern consumers is light. Borings and turnings are among the slowest grades. Bulk of activity is for export, although shipments to dock this month are likely to be heavier than in June.

**Detroit**—Scrap prices continue to move upward here as dealers grow more confident that the bottom of the slump has been passed. Only one purchase was reported, indicating that market strength is based on sentiment. An out-of-town broker came into the district looking for a bargain on bundles, but the local brokers upped the ante, lifting the price to $27, delivered at the docks.

Canadian mills have taken up some of their previously purchased scrap which has been on the ground, leaving little support for the report that Canadian buyers will be in the market again shortly.

There's talk that some blast furnaces may want turnings in the near future.

**Youngstown** — A second major Youngstown steel producer has bought some No. 1 heavy melting scrap at $33 a gross ton, specifying that it must be industrial grade material. This is the second purchase here recently.

The market, however, remains dull. There is no sign of any important activity. Many peddlers have left the business and some of the "old reliables" are being carried over with small loans from dealers.

**Buffalo**—A slightly better feeling developed in the scrap market here last week as a result of improvement in steel production. However, the market showed no more than sympathetic firmness, with prices holding at prevailing levels.

Current mill orders on No. 2 grades will carry through the month and little price change is expected in these principal categories of scrap. The turnings grades continue in slow demand.

Cast scrap is on the soft side as a result of poor demand from foundries. But most dealers feel that the scrap market as a whole has reached a leveling-off point.

**Cincinnati** — Supported by mill buying at the beginning of this month, the scrap market continues strong. Dealer resistance, while not acute, indicates a likely upturn in prices. Mill buying centers on principal steelmaking grades; no interest is shown in borings and turnings. Steelmaking rates in the district are rising after sagging to the low 20 per cent brackets.

**St. Louis**—Scrap prices are fairly steady, although slight downtrends in some grades have developed. Sales are light: The feeling is that mills are not buying as much as they melt.

A drop of $2 a ton was posted on rails (18 in. and under), angles, and splice bars. The situation is attributed to backing and filling in the rail scrap market, rather than a pattern.

**Birmingham** — An Atlanta mill

(*Please turn to Page 223*)

# Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, May 14, 1958. *Changes shown in italics.*

## STEELMAKING SCRAP COMPOSITE

| | |
|---|---|
| May 14 | $32.83 |
| May 7 | 32.00 |
| Apr. Avg. | 33.08 |
| May 1957 | 45.75 |
| May 1953 | 39.17 |

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

### PITTSBURGH

| | |
|---|---|
| No. 1 heavy melting | 31.00-32.00 |
| No. 2 heavy melting | 27.00-28.00 |
| No. 1 dealer bundles | 31.00-32.00 |
| *No. 2 bundles* | *24.00-25.00* |
| *No. 1 busheling* | *31.00-32.00* |
| *No. 1 factory bundles* | *36.00-37.00* |
| Machine shop turnings | 13.00-14.00 |
| Mixed borings, turnings | 13.00-14.00 |
| Short shovel turnings | 17.00-18.00 |
| Cast iron borings | 17.00-18.00 |
| Cut structurals: | |
| 2 ft and under | 37.00-38.00 |
| 3 ft lengths | 35.00-36.00 |
| Heavy turnings | 28.00-29.00 |
| Punchings & plate scrap | 37.00-38.00 |
| Electric furnace bundles | 37.00-38.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 40.00-41.00 |
| Stove plate | 40.00-41.00 |
| Unstripped motor blocks | 23.00-24.00 |
| Clean auto cast | 40.00-41.00 |
| Drop broken machinery | 48.00-49.00 |

Railroad Scrap

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *36.00-37.00* |
| Rails, 2 ft and under | 53.00-54.00 |
| Rails, 18 in. and under | 54.00-55.00 |
| Random rails | 50.00-51.00 |
| *Railroad specialties* | *43.00-44.00* |
| Angles, splice bars | 47.00-48.00 |
| Rails, rerolling | 55.00-56.00 |

Stainless Steel Scrap

| | |
|---|---|
| 18-8 bundles & solids | 170.00-175.00 |
| *18-8 turnings* | *95.00-100.00* |
| *430 bundles & solids* | *95.00-100.00* |
| 430 turnings | 50.00-52.00 |

### CHICAGO

| | |
|---|---|
| *No. 1 hvy melt., indus.* | *33.00-34.00* |
| *No. 1 hvy melt., dealer* | *31.00-32.00* |
| *No. 2 heavy melting* | *28.00-29.00* |
| *No. 1 factory bundles* | *36.00-37.00* |
| *No. 1 dealer bundles* | *31.00-32.00* |
| *No. 2 bundles* | *23.00-24.00* |
| *No. 1 busheling, indus.* | *33.00-34.00* |
| *No. 1 busheling, dealer* | *31.00-32.00* |
| *Machine shop turnings* | *16.00-17.00* |
| *Mixed borings, turnings* | *18.00-19.00* |
| *Short shovel turnings* | *18.00-19.00* |
| *Cast iron borings* | *18.00-19.00* |
| *Cut structurals, 3 ft* | *36.00-37.00* |
| *Punchings & plate scrap* | *37.00-38.00* |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 38.00-39.00 |
| Stove plate | 34.00-35.00 |
| Unstripped motor blocks | 30.00-31.00 |
| Clean auto cast | 43.00-44.00 |
| Drop broken machinery | 43.00-44.00 |

Railroad Scrap

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *35.00-36.00* |
| R.R. malleable | 48.00-49.00 |
| *Rails, 2 ft and under* | *48.00-49.00* |
| *Rails, 18 in. and under* | *49.00-50.00* |
| Angles, splice bars | 43.00-44.00 |
| *Axles* | *53.00-54.00* |
| *Rails, rerolling* | *50.00-51.00* |

Stainless Steel Scrap

| | |
|---|---|
| 18-8 bundles & solids | 160.00-165.00 |
| 18-8 turnings | 85.00-95.00 |
| *430 bundles & solids* | *90.00-95.00* |
| *430 turnings* | *45.00-50.00* |

### YOUNGSTOWN

| | |
|---|---|
| No. 1 heavy melting | 33.00-34.00 |
| No. 2 heavy melting | 22.00-23.00 |
| No. 1 busheling | 33.00-34.00 |
| No. 1 bundles | 33.00-34.00 |
| No. 2 bundles | 21.00-22.00 |
| Machine shop turnings | 9.00-10.00 |
| Short shovel turnings | 13.00-14.00 |
| Cast iron borings | 13.00-14.00 |
| Low phos. | 34.00-35.00 |
| Electric furnace bundles | 34.00-35.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 35.00-36.00 |

### CLEVELAND

| | |
|---|---|
| No. 1 heavy melting | 30.00-31.00 |
| No. 2 heavy melting | 19.00-20.00 |
| No. 1 factory bundles | 31.00-32.00 |
| No. 1 bundles | 30.00-31.00 |
| No. 2 bundles | 20.00-21.00 |
| No. 1 busheling | 30.00-31.00 |
| Machine shop turnings | 7.00-8.00 |
| Short shovel turnings | 11.00-12.00 |
| Mixed borings, turnings | 11.00-12.00 |
| Cast iron borings | 11.00-12.00 |
| Cut foundry steel | 34.00-35.00 |
| Cut structurals, plates 2 ft and under | 36.00-37.00 |
| Low phos, punchings & plate | 30.00-31.00 |
| Alloy free, short shovel turnings | 16.00-17.00 |
| Electric furnace bundles | 31.00-32.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 42.00-43.00 |
| Charging box cast | 33.00-34.00 |
| Heavy breakable cast | 33.00-34.00 |
| Stove plate | 43.00-44.00 |
| Unstripped motor blocks | 25.00-26.00 |
| Brake shoes | 33.00-34.00 |
| Clean auto cast | 42.00-43.00 |
| Burnt cast | 30.00-31.00 |
| Drop broken machinery | 47.00-48.00 |

Railroad Scrap

| | |
|---|---|
| R.R. malleable | 60.00-61.00 |
| Rails, 2 ft and under | 56.00-57.00 |
| Rails, 18 in. and under | 57.00-58.00 |
| Rails, random lengths | 49.00-50.00 |
| Cast steel | 44.00-45.00 |
| Railroad specialties | 47.00-48.00 |
| Uncut tires | 40.00-41.00 |
| Angles, splice bars | 46.00-47.00 |
| Rails, rerolling | 51.00-52.00 |

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| 18-8 bundles, solids | 160.00-165.00 |
| 18-8 turnings | 90.00-95.00 |
| 430 clips, bundles, solids | 75.00-80.00 |
| 430 turnings | 40.00-50.00 |

### ST. LOUIS

(Brokers' buying prices)

| | |
|---|---|
| No. 1 heavy melting | 32.00 |
| No. 2 heavy melting | 30.00 |
| No. 1 bundles | 32.00 |
| No. 2 bundles | 23.00 |
| No. 1 busheling | 32.00 |
| Machine shop turnings | 16.00 |
| Short shovel turnings | 18.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 40.00 |
| Charging box cast | 33.00 |
| Heavy breakable cast | 33.00 |
| Unstripped motor blocks | 34.00 |
| Clean auto cast | 44.00 |
| Stove plate | 37.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 34.50 |
| *Rails, 18 in. and under* | *48.00* |
| *Rails, random lengths* | *43.00* |
| *Rails, rerolling* | *46.50* |
| *Angles, splice bars* | *43.00* |

### BIRMINGHAM

| | |
|---|---|
| No. 1 heavy melting | 30.00-31.00 |
| No. 2 heavy melting | 25.00-26.00 |
| No. 1 bundles | 30.00-31.00 |
| No. 2 bundles | 18.00-19.00 |
| No. 1 busheling | 30.00-31.00 |
| Cast iron borings | 12.00-13.00 |
| Machine shop turnings | 22.00-23.00 |
| Short shovel turnings | 23.00-24.00 |
| *Bar crops and plates* | *36.00-37.00* |
| *Structurals & plates* | *35.00-36.00* |
| *Electric furnace bundles* | *34.00-35.00* |
| *Electric furnace:* | |
| *2 ft and under* | *33.00-34.00* |
| *3 ft and under* | *32.00-33.00* |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 48.00-49.00 |
| Stove plate | 48.00-49.00 |
| *Unstripped motor blocks* | *38.00-39.00* |
| Charging box cast | 22.00-23.00 |
| No. 1 wheels | 34.00-35.00 |

Railroad Scrap

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *32.00-33.00* |
| Rails, 18 in. and under | 46.00-47.00 |
| Rails, rerolling | 45.00-46.00 |
| *Rails, random lengths* | *43.00-44.00* |
| *Angles, splice bars* | *38.00-39.00* |

### PHILADELPHIA

| | |
|---|---|
| No. 1 heavy melting | 34.00-35.00 |
| No. 2 heavy melting | 31.00 |
| No. 1 bundles | 34.00-35.00 |
| No. 2 bundles | 24.00 |
| No. 1 busheling | 34.00-35.00 |
| Electric furnace bundles | 36.00 |
| Mixed borings, turnings | 16.00† |
| Short shovel turnings | 18.00 |
| Machine shop turnings | 15.00 |
| Heavy turnings | 29.00 |
| Structural & plate | 39.00-40.00 |
| Couplers, springs, wheels | 43.50 |
| Rail crops, 2 ft & under | 56.00-58.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 38.00 |
| Heavy breakable cast | 41.00 |
| Malleable | 58.00-59.00 |
| Drop broken machinery | 47.00-48.00 |

### NEW YORK

(Brokers' buying prices)

| | |
|---|---|
| No. 1 heavy melting | 29.00-30.00 |
| No. 2 heavy melting | 25.00-26.00 |
| No. 1 bundles | 29.00-30.00 |
| No. 2 bundles | 16.00-17.00 |
| Machine shop turnings | 8.00-9.00† |
| Mixed borings, turnings | 9.00-10.00† |
| Short shovel turnings | 11.00-12.00† |
| Low phos (structurals & plates) | 32.00-33.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 35.00-36.00 |
| Unstripped motor blocks | 24.00-25.00 |
| Heavy breakable | 33.00-34.00 |

Stainless Steel

| | |
|---|---|
| 18-8 sheets, clips, solids | 135.00-140.00 |
| 18-8 borings, turnings | 45.00-50.00 |
| 410 sheets, clips, solids | 50.00-55.00 |
| *430 sheets, clips, solids* | *60.00-65.00* |

### BUFFALO

| | |
|---|---|
| No. 1 heavy melting | 26.00-27.00 |
| No. 2 heavy melting | 22.00-23.00 |
| No. 1 bundles | 26.00-27.00 |
| No. 2 bundles | 20.00-21.00 |
| No. 1 busheling | 26.00-27.00 |
| Mixed borings, turnings | 13.00-14.00 |
| Machine shop turnings | 10.00-11.00 |
| Short shovel turnings | 14.00-15.00 |
| Cast iron borings | 13.00-14.00 |
| Low phos. structurals and plate, 5 ft and under 2 ft and under | 31.00-32.00 35.00-36.00 |

Cast Iron Grades

(F.o.b. shipping point)

| | |
|---|---|
| No. 1 cupola | 39.00-40.00 |
| No. 1 machinery | 43.00-44.00 |

Railroad Scrap

| | |
|---|---|
| Rails, random lengths | 45.00-46.00 |
| Rails, 3 ft and under | 51.00-52.00 |
| Railroad specialties | 35.00-36.00 |

### CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| No. 1 heavy melting | 29.00-30.00 |
| No. 2 heavy melting | 25.00-26.00 |
| No. 1 bundles | 29.00-30.00 |
| No. 2 bundles | 19.50-20.50 |
| No. 1 busheling | 29.00-30.00 |
| Machine shop turnings | 9.00-10.00 |
| Mixed borings, turnings | 9.00-10.00 |
| Short shovel turnings | 11.00-12.00 |
| Cast iron borings | 9.00-10.00 |
| Low phos. 18 in. | 36.00-37.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 38.00-39.00 |
| Heavy breakable cast | 32.00-33.00 |
| Charging box cast | 32.00-33.00 |
| Drop broken machinery | 45.00-46.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 33.00-34.00 |
| Rails, 18 in. and under | 52.00-53.00 |
| Rails, random lengths | 43.00-44.00 |

### HOUSTON

(Brokers' buying prices; f.o.b. cars)

| | |
|---|---|
| No. 1 heavy melting | 29.00† |
| No. 2 heavy melting | 27.00† |
| No. 2 bundles | 19.00† |
| Machine shop turnings | 12.00 |
| Crushed turnings | 16.00 |
| *Low phos. plates, structurals* | *35.00†* |

Cast Iron Grades

| | |
|---|---|
| *No. 1 cupola* | *34.50* |
| Heavy breakable | 30.00 |
| *Unstripped motor blocks* | *33.50* |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 31.00† |

### BOSTON

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| No. 1 heavy melting | 22.00-23.00 |
| No. 2 heavy melting | 18.00-19.00 |
| No. 1 bundles | 22.00-23.00 |
| No. 2 bundles | 13.00-14.00 |
| No. 1 busheling | 23.00-24.00 |
| Machine shop turnings | 5.00-6.00† |
| Mixed borings, turnings | 5.00-6.00† |
| Short shovel turnings | 6.00-7.00† |
| No. 1 cast | 28.00-29.00 |
| Mixed cupola cast | 27.00-28.00 |
| No. 1 machinery cast | 31.00-32.00 |

### DETROIT

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| *No. 1 heavy melting* | *23.00-24.00* |
| *No. 2 heavy melting* | *17.00-18.00* |
| *No. 1 bundles* | *24.00-25.00* |
| No. 2 bundles | 12.00-13.00 |
| *No. 1 busheling* | *23.00-24.00* |
| Machine shop turnings | 5.00-6.00 |
| Mixed borings, turnings | 6.00-7.00 |
| Short shovel turnings | 7.00-8.00 |
| Punchings & plate | 26.00-27.00 |

Cast Iron Grades

| | |
|---|---|
| *No. 1 cupola* | *28.00-29.00* |
| Stove plate | 22.00-23.00 |
| Charging box cast | 21.00-22.00 |
| *Heavy breakable* | *21.00-22.00* |
| Unstripped motor blocks | 11.00-12.00 |
| *Clean auto cast* | *29.00-30.00* |

### SEATTLE

| | |
|---|---|
| No. 1 heavy melting | 27.00* |
| No. 2 heavy melting | 25.00† |
| No. 1 bundles | 21.00† |
| No. 2 bundles | 20.00† |
| Machine shop turnings | 16.00 |
| Mixed borings, turnings | 16.00 |
| Electric furnace No. 1 | 38.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 31.00 |
| Heavy breakable cast | 28.00 |
| Unstripped motor blocks | 23.00 |
| Stove plate (f.o.b. plant) | 21.00 |

### LOS ANGELES

| | |
|---|---|
| No. 1 heavy melting | 34.00 |
| No. 2 heavy melting | 32.00 |
| No. 1 bundles | 30.00 |
| No. 2 bundles | 22.00 |
| Machine shop turnings | 9.00 |
| Shoveling turnings | 11.00 |
| Cast iron borings | 11.00 |
| Cut structurals and plate 1 ft and under | 45.00 |

Cast Iron Grades

(F.o.b. shipping point)

| | |
|---|---|
| No. 1 cupola | 41.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 34.00 |

### SAN FRANCISCO

| | |
|---|---|
| No. 1 heavy melting | 32.00 |
| No. 2 heavy melting | 30.00 |
| No. 1 bundles | 30.00 |
| No. 2 bundles | 22.00 |
| Machine shop turnings | 15.00 |
| Mixed borings, turnings | 15.00 |
| Cast iron borings | 15.00 |
| Heavy turnings | 15.00 |
| Short shovel turnings | 15.00 |
| Cut structurals, 3 ft | 40.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 42.00 |
| Charging box cast | 34.00 |
| Stove plate | 34.00 |
| Heavy breakable cast | 28.00 |
| Unstripped motor blocks | 31.00 |
| Clean auto cast | 40.00 |
| Drop broken machinery | 40.00 |
| No. 1 wheels | 34.00 |

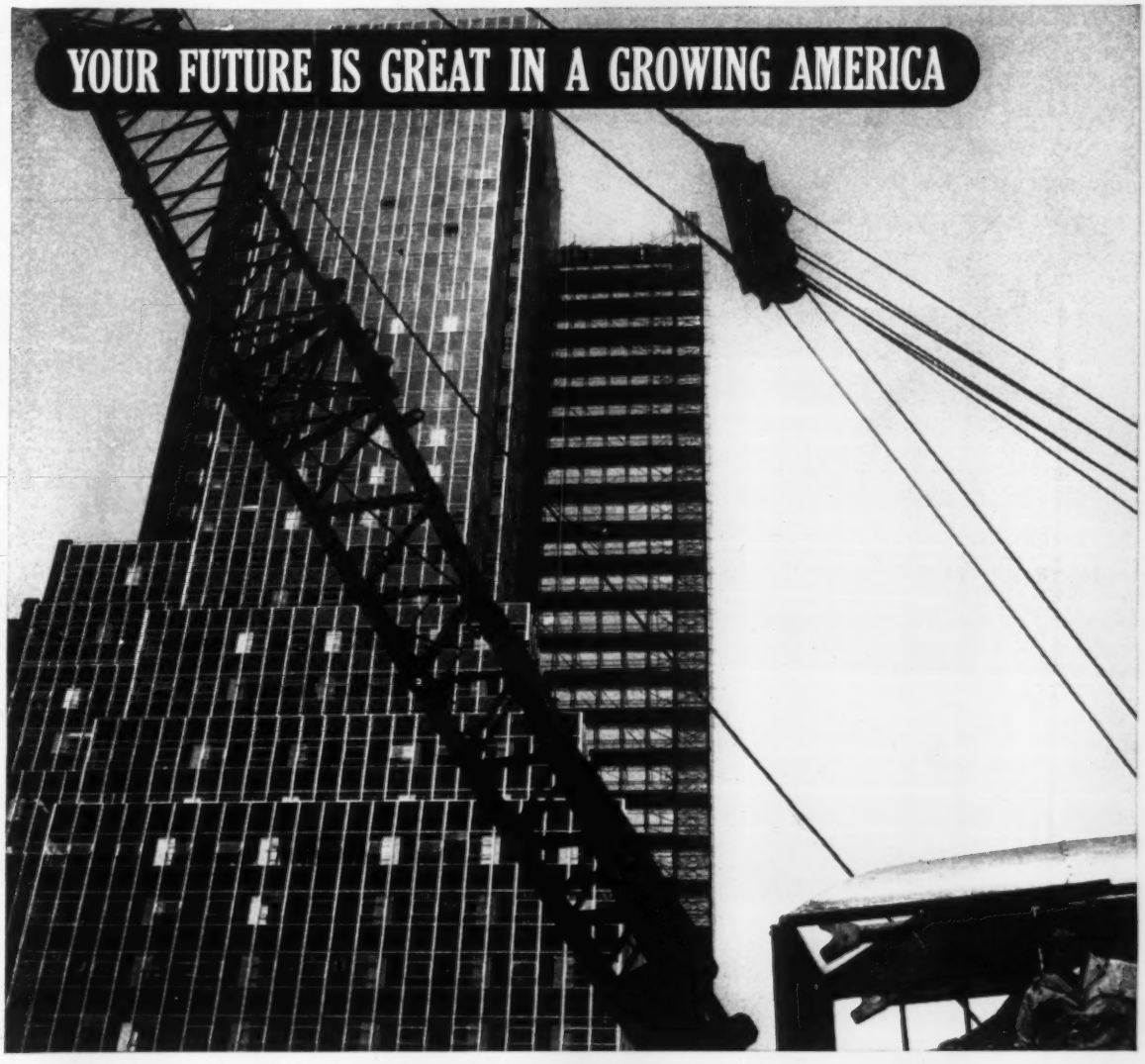
### HAMILTON, ONT.

| | |
|---|---|
| No. 1 heavy melting | 30.00 |
| No. 2 heavy melting | 26.00 |
| No. 1 bundles | 30.00 |
| No. 2 bundles | 23.00 |
| Mixed steel scrap | 25.00 |
| Mixed borings, turnings | 15.00 |
| Busheling, new factory: | |
| Prepared | 30.00 |
| Unprepared | 24.00 |
| Short steel turnings | 19.00 |

Cast Iron Grades‡

| | |
|---|---|
| No. 1 machinery cast | 45.00-50.00 |

†Nominal.
‡F.o.b. Hamilton, Ont.

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**2. More Jobs**—Though employment in some areas has fallen off, there are 15 million more jobs than in 1939—and there will be *22 million more* in 1975 than today.

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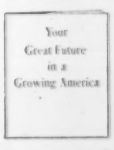


# Will Barter Come Back?

**Sentiment grows in Congress to amend the present program to make it more workable. The administration has gone on record as opposing such a move**

Nonferrous Metal Prices, Pages 222 & 223

ACTION by the House Agricultural Committee may pave the way for modifications of the barter program to aid segments of the ailing nonferrous industry.

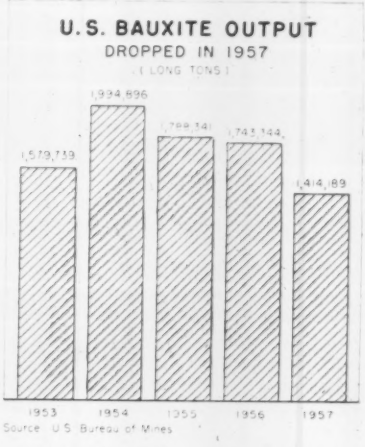
The program expires on June 30 but will undoubtedly be extended for at least one year (as requested by the Department of Agriculture), or two years (as favored by some members of Congress). There's strong support in some quarters of Congress to relax restrictions that have made the bartering of American farm products (mostly wheat) for foreign origin metals virtually inoperable.

**One-Two Punch**—Lead and zinc probably have been most seriously hit by USDA restrictions. In past years, a lot of the two metals went to the U. S. stockpile via barter. It had the effect of siphoning off large tonnages from the world market that might otherwise have found their way into the U. S. as imports. But USDA virtually killed off the program last year with the requirement that principals to an agreement would have to show that the barter would "be in addition to and would not interfere with what might be sold in normal trade."

Another 1957 restriction was the requirement that "metal had to originate in a foreign country." Previous to that time, domestic companies were buying the foreign ore, smelting it, then sending the metal to stockpile via barter provisions.

A USDA spokesman told STEEL the government is still considering barter offers. It's tough to swing one though. Contracts negotiated during the first quarter came to only $12.7 million, vs. $104.7 million in the same period last year.

**What Administration Wants**—The official line is against a change. Don Paarlberg, assistant secretary of agriculture, recently told the House Agricultural Committee an expansion of the program might "result in substituting barter for dollar sales and also might hamper surplus disposal sales for foreign currencies." It's also believed the administration is sensitive to "dumping" charges from such large wheat producing countries as Canada and Australia.




Attempts to amend the barter provisions earlier this year failed in the Senate by only a few votes. But there's a growing nonpartisan clique that believes current agricultural disposal amounts to a giveaway and that under barter Uncle Sam would at least get a return.

**Changes**—House sentiment for a revamping of barter appears to be stronger: Some members of the House Agricultural Committee believe the program should be renewed with vigor. It's felt the committee will recommend some broadening of barter provisions. Sources on Capitol Hill say a bill to expand the barter program would have a better than fair chance of passing the House and Senate.

## Ormet Now Producing

Ormet Corp. officially began production at its primary aluminum plant in Omal, Ohio, last week when it started up the first of five potlines. Plans call for the remaining potlines to come in at 60-day intervals.

The 180,000-ton-a-year plant is the U. S.'s second largest reduction facility. It's jointly owned by Olin Mathieson Chemical Corp. and Revere Copper & Brass Inc.

## Shifts Foundry Operation

Aluminum Industries Inc. is shutting down its Milwaukee operations and moving them to its main plant at Cincinnati. The firm's products include aluminum castings and automotive parts.

## Market Memos

• International Nickel Co. Inc. plans a $3.5-million expansion for its Huntington, W. Va., works. It will increase cold drawing production capacity about 50 per cent.

• Reynolds Metals Co. is cutting back production at its primary aluminum reduction plants in Listerhill, Ala., and Corpus Christi, Tex.

### NONFERROUS PRICE RECORD

| | Price May 7 | Last Change | Previous Price | Apr. Avg | Mar. Avg | May, 1957 Avg |
|---|---|---|---|---|---|---|
| Aluminum | 24.00 | Apr. 1, 1958 | 26.00 | 24.000 | 26.000 | 25.000 |
| Copper | 23.75-25.00 | Apr. 24, 1958 | 23.50-25.00 | 24.323 | 24.163 | 31.087 |
| Lead | 11.80 | Apr. 1, 1958 | 12.80 | 11.800 | 12.800 | 15.185 |
| Magnesium | 35.25 | Aug. 13, 1956 | 33.75 | 35.250 | 35.250 | 35.250 |
| Nickel | 74.00 | Dec. 6, 1956 | 64.50 | 74.000 | 74.000 | 74.000 |
| Tin | 94.625 | May 14, 1958 | 94.50 | 93.021 | 93.425 | 98.341 |
| Zinc | 10.00 | July 1, 1957 | 10.50 | 10.000 | 10.000 | 13.500 |

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. shipping point; MAGNESIUM, pig, 99.8%, Velasco, Tex.

IT PAYS TO STANDARDIZE ON **STANSCREW**

# Stanscrew service helps insure quality for new Tuthill pump

Marvin Williams, Works Manager, Tuthill Pump Company, says: "Dependable, precision-built fasteners are an essential ingredient of the quality we build into Tuthill Pumps.

"Therefore, when we designed our new series of high pressure Powermax pumps, we had our distributor arrange for a visit from Stanscrew's fastener specialist. The socket head cap screws he recommended for this demanding application met the stringent standards we have established. And because of our years of experience with Stanscrew, we know we can count on precise product uniformity and fast service."

Hundreds of other leading companies in American industry have also learned that it pays to standardize on Stanscrew. For Stanscrew offers a comprehensive line of over 4,000 different types and sizes of standard fasteners . . . including a complete selection of socket, set, and cap screws. These are produced in three modern plants by fastener specialists with over 85 years of specialized experience. All 4,000 items are always in stock . . . quickly available.

*When you have a fastener problem, call your Stanscrew distributor. He will arrange for a prompt visit from the Stanscrew fastener specialist. The specific recommendations he will make can often mean important savings.*

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**HMS** | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
**WESTERN** | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

**STANDARD SCREW COMPANY** 2701 Washington Boulevard, Bellwood, Illinois

# Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

## PRIMARY METALS AND ALLOYS

**Aluminum:** 99.5%, pigs, 24.00; ingots, 26.10, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

**Aluminum Alloy:** No. 13, 27.90; No. 43, 27.70; No. 195, 28.70; No. 214, 29.50; No. 356, 27.90, 30-lb ingots.

**Antimony:** R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 23.50-24.50, New York, duty paid, 10,000 lb or more.

**Beryllium:** 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

**Beryllium Aluminum:** 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

**Beryllium Copper:** 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

**Bismuth:** $2.25 per ton, ton lots.

**Cadmium:** Sticks and bars, $1.55 per lb deld.

**Cobalt:** 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100 lb case; $2.07 per lb under 100 lb.

**Columbium:** Powder, $55-90 per lb, nom.

**Copper:** Electrolytic, 25.00 deld.; custom smelters, 23.75; lake, 25.00 deld.; fire refined, 24.75 deld.

**Germanium:** First reduction, $179.17-197.31 per lb; intrinstic grade, $197.31-220 per lb, depending on quantity.

**Gold:** U. S. Treasury, $35 per oz.

**Indium:** 99.9%, $2.25 per troy oz.

**Iridium:** $70-80 nom. per troy oz.

**Lead:** Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

**Lithium:** 98 + %, 50-100 lb, cups or ingots, $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire $15, f.o.b. Minneapolis.

**Magnesium:** Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. thick, 59.00 f.o.b. Madison, Ill.

**Magnesium Alloys:** AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

**Mercury:** Open market, spot, New York, $228-230 per 76-lb flask.

**Molybdenum:** Unalloyed, turned extrusions, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

**Nickel:** Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 779.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty, New York basis, add 1.01. Nickel oxide sinter, 71.25 per lb of nickel content before 1 cent freight allowance, f.ob. Copper Cliff, Ont.

**Osmium:** $70-100 per troy oz nom.

**Palladium:** $19-21 per troy oz.

**Platinum:** $64-70 per troy oz from refineries.

**Radium:** $16-21.50 per mg radium content, depending on quantity.

**Rhodium:** $118-125 per troy oz.

**Ruthenium:** $45-55 per troy oz.

**Selenium:** $7.00 per lb, commercial grade.

**Silver:** Open market 88.625 per troy oz.

**Sodium:** 16.50, c.l.; 17.00 l.c.l.

**Tantalum:** Rod, $60 per lb; sheet, $55 per lb.

**Tellurium:** $1.65-1.85 per lb.

**Thallium:** $7.50 per lb.

**Tin:** Straits, N. Y., spot and prompt, 94.625.

**Titanium:** Sponge, 99.3 + %, grade A-1 ductile (0.3% Fe max.), $2.05; grade A-2 (0.5% Fe max.), $1.85 per lb.

**Tungsten:** Powder, 98.8%, carbon reduced, 1000-lb lots, $3.15 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99 + % hydrogen reduced, $3.85.

**Zinc:** Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 11.00; special high grade, 11.25 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.75; No. 5, 14.25 deld.

**Zirconium:** Sponge, commercial grade, $5-10 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

## SECONDARY METALS AND ALLOYS

**Aluminum Ingot:** Piston alloys, 24.00-24.50; No. 12 foundry alloy (No. 2 grade), 21.25-21.50; 5% silicon alloy, 0.60 Cu max., 24.00-24.25; 13 alloy 0.60 Cu max., 24.00-24.25; 195 alloy, 24.25-25.50; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.25; grade 3, 20.00; grade 4, 17.25.

**Brass Ingot:** Red brass, No. 115, 25.25; tin bronze, No. 225, 34.00, No. 245, 28.75; high-leaded tin bronze, No. 305, 29.25, No. 1 yellow, No. 405, 20.75; manganese bronze, No. 421, 23.00.

**Magnesium Alloy Ingot:** AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

## NONFERROUS PRODUCTS

### BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.80, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.78, f.o.b. Temple, Pa.

### COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 30.355; l.c.l., 30.98. Weatherproof, 30,000-lb lots, 32.53; l.c.l., 33.28. Magnet wire deld., 38.43, before quantity discounts.

### LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

### TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $8.50-15.95; sheared mill plate, $6.00-9.50; wire, $6.50-11.00; forging billets, $4.10-4.35; hot-rolled and forged bars, $5.25-6.35.

### ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, $24.00; plate, $12.50-19.20; H.R. strip, $12.50-22.90; $11.00-17.40.

### ZIRCONIUM

C.R. strip, $15.90-31.25; forged or H.R. bars, ribbon zinc in coils, 20.50; plates, 19.00.

### NICKEL, MONEL, INCONEL

| | "A" Nickel | Monel | Inconel |
|---|---|---|---|
| Sheets, C.R. | 126 | 106 | 128 |
| Strips, C.R. | 124 | 108 | 138 |
| Plate, H.R. | 120 | 105 | 121 |
| Rod, Shapes, H.R. | 107 | 89 | 109 |
| Seamless Tubes | 157 | 129 | 200 |

### ALUMINUM

**Sheets:** 1100, 3003, and 5005 mill finish (30,000 lb base; freight allowed).

| Thickness Range, Inches | Flat Sheet | Coiled Sheet |
|---|---|---|
| 0.249-0.136 | 41.10-45.60 | ..... |
| 0.135-0.096 | 41.60-46.70 | ..... |
| 0.125-0.096 | ..... | 38.50-39.10 |
| 0.095-0.077 | 42.30-48.50 | 38.60-39.30 |
| 0.076-0.061 | 42.90-50.80 | 38.80-40.00 |
| 0.060-0.048 | 43.60-53.10 | 39.40-41.10 |
| 0.047-0.038 | 44.20-55.90 | 39.90.32.50 |
| 0.037-0.030 | 44.60-60.90 | 40.30-44.30 |
| 0.029-0.024 | 45.20-52.70 | 40.60-45.00 |
| 0.023-0.019 | 46.20-56.10 | 41.70-43.40 |
| 0.018-0.017 | 47.00-53.40 | 42.30-44.00 |
| 0.016-0.015 | 47.90-54.30 | 43.10-44.80 |
| 0.014 | 48.90 | 44.10-45.80 |
| 0.013-0.012 | 50.10 | 44.80 |
| 0.011 | 51.10 | 46.00 |
| 0.010-0.0095 | 52.60 | 47.40 |
| 0.009-0.0085 | 53.90 | 48.90 |
| 0.008-0.0075 | 55.50 | 50.10 |
| 0.007 | 57.00 | 51.60 |
| 0.006 | 58.60 | 53.00 |

### ALUMINUM (continued)

**Plates and Circles:** Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

| Alloy | Plate Base | Circle Base |
|---|---|---|
| 1100-F, 3003-F | 41.70 | 46.50 |
| 5050-F | 42.80 | 47.60 |
| 3004-F | 43.80 | 49.50 |
| 5052-F | 44.40 | 50.20 |
| 6061-T6 | 44.90 | 51.00 |
| 2024-T4 | 48.60 | 55.40 |
| 7075-T6* | 56.40 | 64.00 |

*24-48 in. width or diam., 72-180 in. lengths.

**Screw Machine Stock:** 30,000 lb base.

| Diam. (in.) or across flats | Round 2011-T3 | Round 2017-T4 | Hexagonal 2011-T3 | Hexagonal 2017-T4 |
|---|---|---|---|---|
| **Drawn** | | | | |
| 0.125 | 76.20 | 73.20 | .... | .... |
| 0.156 | 64.20 | 61.40 | .... | .... |
| 0.172 | .... | 61.40 | .... | .... |
| 0.188 | 64.20 | 61.40 | .... | 79.60 |
| 0.203 | 64.20 | 61.40 | .... | .... |
| 0.219-0.234 | 61.00 | 59.50 | .... | .... |
| 0.250 | 61.00 | 59.50 | 88.40 | 75.90 |
| 0.266-0.281 | 61.00 | 59.50 | .... | .... |
| 0.313 | 61.00 | 59.50 | 81.40 | 72.20 |
| 0.344 | 60.50 | .... | 81.40 | .... |
| **Cold-Finished** | | | | |
| 0.375-0.547 | 60.50 | 59.30 | 72.80 | 67.80 |
| 0.563-0.688 | 60.50 | 59.30 | 69.10 | 63.50 |
| 0.719 | .... | 57.70 | .... | .... |
| 0.750-1.000 | 59.00 | 57.70 | 62.90 | 59.70 |
| 1.063 | 59.00 | 57.70 | .... | 57.60 |
| 1.250-1.500 | 56.60 | 55.40 | 60.80 | 57.60 |
| **Rolled** | | | | |
| 1.563 | 55.00 | 53.70 | .... | .... |
| 1.625-2.000 | 54.30 | 52.90 | 59.60 | 55.50 |
| 2.063 | .... | 51.40 | .... | .... |
| 2.125-2.500 | 52.80 | 51.40 | .... | 55.50 |
| 2.500-3.000 | 51.20 | 49.70 | .... | 55.50 |
| 3.250-3.375 | .... | 49.70 | .... | .... |

**Forging Stock:** Round, Class 1, random lengths, diam. 0.688-8 in., "F" temper: 2014, 41.50-54.30; 6061, 40.90-54.30; 7075, 42.90-56.30; 7079, 43.40-56.80.

**Pipe:** ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

| Nom. Pipe Size (in.) | | Nom. Pipe Size (in.) | |
|---|---|---|---|
| ¾ | $18.60 | 2 | $ 57.40 |
| 1 | 29.35 | 4 | 157.60 |
| 1¼ | 39.75 | 6 | 282.95 |
| 1½ | 47.50 | 8 | 425.80 |

**Extruded Solid Shapes:**

| Factor | Alloy 6063-T5 | Alloy 6062-T6 |
|---|---|---|
| 9-11 | 45.40-47.00 | 58.60-62.80 |
| 12-14 | 45.70-47.20 | 59.30-63.80 |
| 15-17 | 45.90-47.90 | 60.50-65.50 |
| 18-20 | 46.50-48.30 | 62.50-68.10 |

### MAGNESIUM

**Sheet and Plate:** AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, .25-3.0 in., 73.00.

**Extruded Solid Shapes:**

| Factor | Com. Grade (AZ31C) | Spec. Grade (AZ31B) |
|---|---|---|
| 6-8 | 69.60-72.40 | 84.60-87.40 |
| 12-14 | 70.70-73.00 | 85.70-88.00 |
| 24-26 | 75.60-76.30 | 90.60-91.30 |
| 36-38 | 89.20-90.30 | 104.20-105.30 |

## NONFERROUS SCRAP

### DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

**Aluminum:** 1100 clippings, 12.00-12.50; old sheets, 9.00-9.50; borings and turnings, 5.00-

## BRASS MILL PRICES

MILL PRODUCTS a — SCRAP ALLOWANCES f

| | Sheet, Strip, Plate | Rod | Wire | Seamless Tubes | Clean Heavy | Rod Ends | Clean Turnings |
|---|---|---|---|---|---|---|---|
| Copper | 48.13b | 45.36c | | 48.32 | 21.000 | 21.000 | 20.250 |
| Yellow Brass | 42.69 | 29.53d | 43.23 | 45.60 | 16.125 | 15.875 | 14.500 |
| Low Brass, 80% | 44.90 | 44.84 | 45.44 | 47.71 | 17.875 | 17.625 | 17.125 |
| Red Brass, 85% | 45.67 | 45.61 | 46.21 | 48.48 | 18.625 | 18.375 | 17.875 |
| Com. Bronze, 90% | 46.98 | 46.92 | 47.52 | 49.54 | 19.250 | 19.000 | 18.500 |
| Manganese Bronze | 50.81 | 44.91 | 55.44 | .... | 14.875 | 14.625 | 14.125 |
| Muntz Metal | 45.19 | 41.00 | .... | .... | 15.125 | 14.875 | 14.375 |
| Naval Brass | 47.07 | 41.38 | 54.13 | 50.48 | 14.875 | 14.625 | 14.125 |
| Silicon Bronze | 52.84 | 52.03 | 52.88 | 54.77 | 20.625 | 20.375 | 19.625 |
| Nickel Silver, 10% | 57.93 | 60.26 | 60.26 | .. | 21.125 | 20.875 | 10.562 |
| Phos. Bronze, A-5% | 67.17 | 67.67 | 67.67 | 68.85 | 21.875 | 21.625 | 20.625 |

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, or any or all kinds of scrap, add 1 cent per lb.

5.50; crankcase, 9.00-9.50; industrial castings, 9.00-9.50.

**Copper and Brass:** No. 1 heavy copper and wire, 18.00-18.50; No. 2 heavy copper and wire, 16.00-16.50; light copper, 14.00-14.50; No. 1 composition red brass, 15.00-15.50; No. 1 composition turnings, 14.00-14.50; new brass clippings, 13.00-13.50; light brass, 8.50-9.00; heavy yellow brass, 10.50-11.00; new brass rod ends, 11.00-11.50; auto radiators, unsweated, 11.00-11.50; cocks and faucets, 12.50-13.00; brass pipe, 12.50-13.00.

**Lead:** Heavy, 7.50-8.00; battery plates, 2.75-3.00; linotype and stereotype, 9.75-10.25; electrotype, 9.00-9.50; mixed babbitt, 9.75-10.25.

**Monel:** Clippings, 28.00-29.00; old sheets, 25.00-26.00; turnings, 20.00-23.00; rods, 28.00-29.00.

**Nickel:** Sheets and clips, 42.00-45.00; rolled anodes, 42.00-45.00; turnings, 37.00-40.00; rod ends, 42.00-45.00.

**Zinc:** Old zinc, 3.00-3.25; new diecast scrap, 2.75-3.00; old diecast scrap, 1.50-1.75.

### REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

**Aluminum:** 1100 clippings, 15.50-16.25; 3003 clippings, 15.50-16.25; 6151 clippings, 15.50-16.50; 5052 clippings, 15.00-15.75; 2014 clippings, 15.00-15.25; 2017 clippings, 15.00-15.25; 2024 clippings, 15.00-15.25; mixed clippings, 14.00-14.75; old sheets, 11.50-12.25; old cast, 11.50-12.25; clean old cable (free of steel), 14.50-15.25; borings and turnings, 12.00-13.00.

**Beryllium Copper:** Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 51.00; light scrap, 46.00; turnings and borings, 31.00.

**Copper and Brass:** No. 1 heavy copper and wire, 20.00; No. 2 heavy copper and wire, 18.25; light copper, 16.00; refinery brass (60% copper) per dry copper content, 17.75.

### INGOTMAKERS' BUYING PRICES

**Copper and Brass:** No. 1 heavy copper and wire, 20.00; No. 2 heavy copper and wire, 18.25; light copper, 16.00; No. 1 composition borings, 17.50; No. 1 composition solids, 18.00; heavy yellow brass solids, 12.50; yellow brass turnings, 11.50; radiators, 14.00.

## PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

### ANODES

**Cadmium:** Special or patented shapes, $1.70

**Copper:** Flat-rolled, 41.79; oval, 40.00, 5000-10,000 lb; electrodeposited, 31.25, 2000-5000 lb lots; cast, 36.25, 5000-10,000 lb quantities.

**Nickel:** Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

**Tin:** Bar or slab, less than 200 lb, 112.50; 200-499 lb, 111.00; 500-999 lb, 110.50; 1000 lb or more, 110.00.

**Zinc:** Balls, 16.00; flat tops, 16.00; flats, 19.25; ovals, 18.50, ton lots.

### CHEMICALS

**Cadmium Oxide:** $1.70 per lb in 100-lb drums.

**Chromic Acid:** 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30; f.o.b. Detroit.

**Copper Cyanide:** 100-200 lb, 68.40; 300-900 lb, 66.40; 1000-19,900 lb, 64.40.

**Copper Sulphate:** 100-1900 lb, 13.70; 2000-5900 lb, 11.70; 6000-11,900 lb, 11.45; 12,000-22,900 lb, 11.20; 23,000 lb or more, 10.70.

**Nickel Chloride:** 100 lb, 48.50; 200 lb, 46.50; 300 lb, 45.50; 400-999 lb, 43.50; 10,000 lb or more, 40.50.

**Nickel Sulphate:** 5000-22,000 lb, 33.50; 23,000-35,900 lb, 33.00; 36,000 lb or more, 32.50.

**Sodium Cyanide:** 100 lb, 27.60; 200 lb, 25.90; 400 lb, 22.90; 1000 lb, 21.90; f.o.b. Detroit.

**Sodium Stannate:** Less than 100 lb, 75.20; 100-600 lb, 66.20; 700-1900 lb, 63.50; 2000-9900 lb, 61.60; 10,000 lb or more, 60.30.

**Stannous Chloride (anhydrous):** Less than 25 lb, 164.70; 25 lb, 129.70; 100 lb, 114.70; 400 lb, 112.20; 5200-19,600 lb, 100.00; 20,000 lb or more, 87.80.

**Stannous Sulphate:** Less than 50 lb, 127.50; 50 lb, 97.50; 100-1900 lb, 95.50; 2000 lb or more, 93.50.

**Zinc Cyanide:** 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 217*)

bought a limited quantity of No. 2 heavy melting at an unchanged price this week, but turned down offers of considerable additional tonnage on the same basis. A large Birmingham electric furnace cut its offer $1 a ton, but had no difficulty filling its needs. Some brokers believe prices have about reached bottom; others think some items may go lower. Some cast moved at established prices, but one of the larger consumers is completely out of the market. A Birmingham broker is loading two ships for export at Florida ports.

**Seattle**—The scrap market continues inactive at the $2-lower level announced for May. There has been no other change. Receipts are small. Export interest also lags, although General Metals Corp., this city, recently shipped 750 tons of used railroad axles, over Port of Tacoma terminal, for discharge at a west coast Mexican port for a steel plant in that country.

**San Francisco** — Despite rising consumption by local mills, the price of steel scrap is being "touted" for a $2 a ton drop in the top grades as the next move in the quoted market.

**Los Angeles**—Scrap is still slow, but some dealers note the first rumblings of what might be some improvement by early summer. Scrap inventories held by consumers are dwindling.

## STRUCTURAL SHAPES . . .

### STRUCTURAL STEEL PLACED

4850 tons, plate girder and I-beam bridge, also five I-beam bridges, Harrisburg, Pa., to Harris Structural Steel Co., New York; Berlanti Construction Co., Harrison, N. Y., general contractor.

3215 tons, girder spans, one railroad and three grade crossing structures, New Haven, Conn., to American Bridge Div., U. S. Steel Corp., Pittsburgh; Mariani Construction Co., New Haven, general contractor.

2600 tons, office building and post office for University Properties, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle.

1500 tons, arrival building, American Air Lines, Idlewild Airport, New York, to Harris Structural Steel Co., New York; Turner Construction Co., New York, general contractor.

1000 tons, also 415 tons reinforcing, reconstruction of interstate highway bridge, Vancouver, Wash., to American Bridge Co., Portland; General Construction Co., Portland, Oreg., general contractor.

170 tons, beam bridge superstructure, Nashua, N. H., to Builders Iron Works, Somerville, Mass.; bids direct.

### STRUCTURAL STEEL PENDING

3430 tons, viaduct, Philadelphia; bids May 29, Harrisburg; also 960 tons, reinforcing bars.

1730 tons, two concrete deck truss and two I-beam bridges, Harborcreek, Pa.; bids May 29, Harrisburg; also 655 tons, reinforcing bars.

1015 tons, 2-span plate girder bridge, Aramingo-Harbison Avenues, Philadelphia; bids May 29, Harrisburg; also 255 tons, reinforcing bars.

940 tons, five grade separation structures, Middletown, Conn.; bids May 19, Hartford; also 575 tons, reinforcing bars, and 376 tons, highway mesh.

365 tons, one plate girder and I-beam bridge, Jackson-Cambria, Pa.; bids May 29, Harrisburg; also 435 tons, reinforcing bars, and 925 tons, highway mesh.

355 tons, plate girder and I-beam bridge, Stroud, Pa.; bids May 29, Harrisburg; also 105 tons, reinforcing bars, and 6566 linear ft. steel beam piles.

320 tons, also 330 tons reinforcing, Washington State truss bridge, Grays Harbor County; general contract to H. H. Hawkins, Seattle.

245 tons, Penn-Reading Seashore Lines, Grenloch branch, Camden County, New Jersey; bids May 27, Trenton.

130 tons, two beam bridges, Mansfield-Willington-Coventry, Conn.; bids May 19, Hartford; also 55 tons, reinforcing bars.

## CLASSIFIED ADVERTISING


**WANTED**

Electric Arc Melting Furnace Approx. 5 Ton Top Charge Complete with all electrical and mechanical equipment. Must be good condition.

Att: S. Greitzer, Purchasing Agent
**Harvey Aluminum**
**19200 S. Western Avenue**
**Torrance, California**

**Help Wanted**

**EXPERIENCED SALESMAN** in the field of Steel Mill and Heavy Industrial Overhead Traveling Cranes wanted to handle Ohio and some surrounding territory. Answer Box 657, STEEL, Penton Bldg., Cleveland 13, Ohio.

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Man, qualified to take charge of all administrative phases of a small office operation of an old established and successful steel warehouse distributing and trading organization; doing national business in steel tubing exclusively. Located N. Y. Metropolitan area. Must be an all-around business man, capable take responsibilities, with ability to do detail work himself. Man previously employed in steel tubing warehouse or mill preferred but not essential. Unusual opportunity for right man. WRITE full details. Our employees know of this advertisement. Box 664, STEEL, Penton Bldg., Cleveland 13, Ohio.

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# Versatile salt bath furnace has extra pot...will travel

Versatility and portability are the chief advantages of this immersed electrode Hevi-Duty salt bath furnace at Clevite Research Center in Cleveland. Since work here is experimental, the furnace must be used on a wide variety of operations. It is equipped with a welded steel pot for low-temperature heat treating and an interchangeable ceramic pot for temperatures up to 2300° F.

The furnace is coupled with a transformer and mounted on rollers so that it may be used anywhere in the shop.

Perhaps this combination of adaptability and portability can fit into your operation — and save you the cost of two or more specialized furnaces.

Write for Bulletin 655 for further information about Hevi-Duty salt bath furnaces, or outline your particular problem.

- Heat Processing Furnaces
- Dry Type Transformers
- Constant Current Regulators

HEVI-DUTY ELECTRIC CO.
Milwaukee 1, Wisconsin

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there's so much to choose from at...

HOTEL CLEVELAND

**Cleveland Room**

Dine in the splendid old world setting of a grand dining room. The menu is varied, the service unexcelled.

**Bronze Room**

One of the brightest of the city's supper clubs. Dancing nightly from 9:00 p.m. Air conditioned, of course.

**Rib Room**

A true specialty restaurant For Fabulous Roast Beef, roasted, carved and served to your order.

**MEN'S BAR**

Strictly stag — is this all male haven for good drinks, good food and good talk. Plus sports events on TV.

**TRANSIT BAR**

For rapid service in the most unique bar in the country . . . decorated with an outstanding collection of miniature trains.

**the PATIO**

Pause — in the relaxing, informal atmosphere of the gayly decorated Patio. It's a Cleveland habit to say — "Meet me at the Patio."

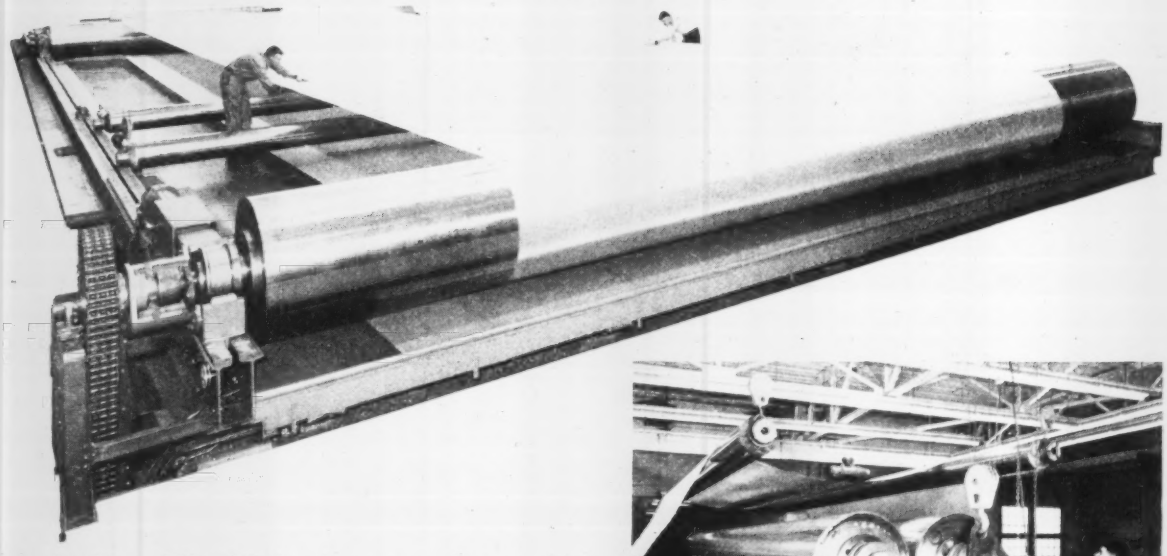
**Coffee Shop**

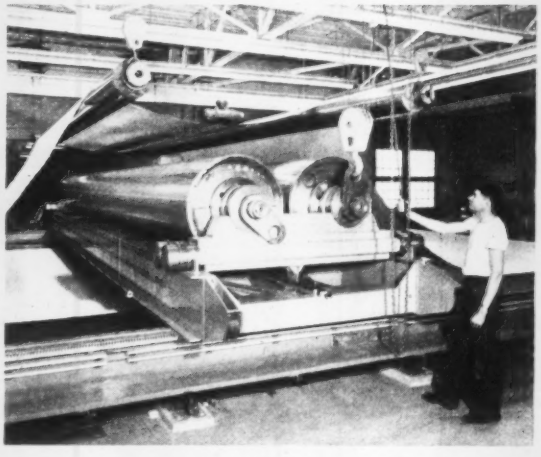
Service is brisk and decor cheerful in the modern, air-conditioned coffee shop. Enjoy a tasty sandwich or a moderately priced meal.

HCA Hotel Cleveland
CLEVELAND, OHIO

# In specialized applications...

# ACIPCO CENTRIFUGALLY SPUN STEEL TUBES





Appleton Wire Works, Inc., manufactures high quality fourdrinier wires for paper making machines. These fine-mesh wires are woven in widths up to 340 inches and lengths over 180 feet.

At its Montgomery, Alabama, plant, Appleton Wire Works, Inc. uses ACIPCO steel tubes— centrifugally spun and polished at Acipco—as stretch rolls on the huge finishing table. These 35.625" OD, 410" long rolls must be both dimensionally stable and balanced and must have a polished surface which will not affect the delicate woven wire surface mechanically or chemically.

Here is another example of Acipco versatility. If your application requires heavy wall steel or alloy iron tubes with special physical, chemical or metallurgical properties "built-in," Acipco can serve you. Investigate Acipco's complete "or e source—from start to finish" facilities. A call o letter will bring full information on Acipco centrifugally spun tube applications in your field.

**VERSATILE ACIPCO CENTRIFUGALLY SPUN STEEL TUBES**

**Size Range:** Lengths up to 410" to meet modern machinery requirements have been produced. OD's from 2.25" to 50", wall thicknesses from .25" to 4".

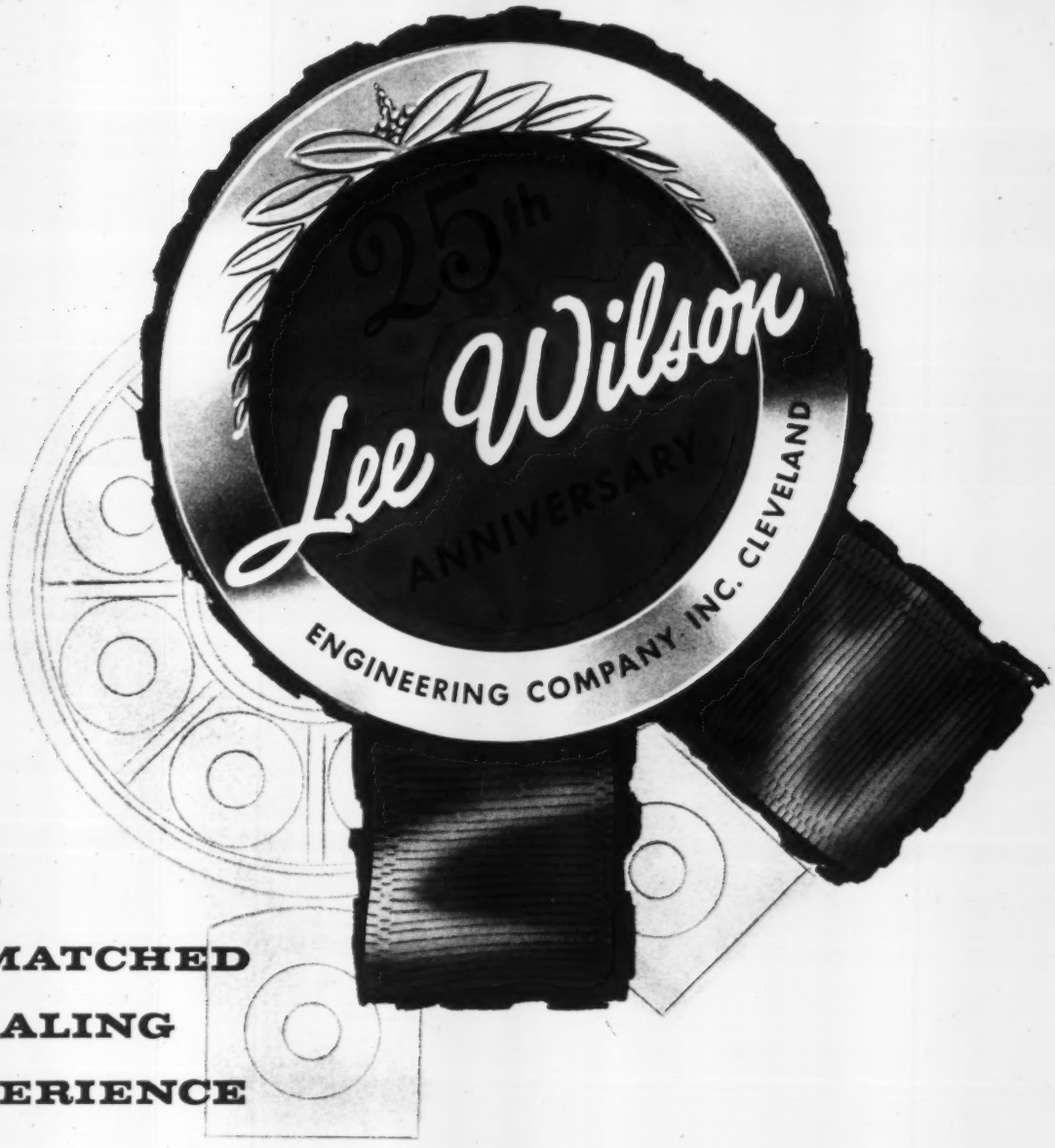
**Analyses:** All alloy grades in steel and cast iron, including heat and corrosion resistant stainless steel, plain carbon steel and special non-standard analyses.

**Furnished:** As cast, rough machined, or finished machined, including honing. Complete welding and machine shop facilities for fabrication.

SPECIAL PRODUCTS DIVISION

AMERICAN CAST IRON PIPE CO.

BIRMINGHAM 2, ALABAMA




**FROM UNMATCHED ANNEALING EXPERIENCE**

# the shadow of things to come!

THE LEE WILSON OPENED COIL ANNEALER . . . a high-volume continuous coil annealing furnace that has all the advantages of continuous strand annealing with none of the disadvantages. It requires far less area and installation costs. It is easier to maintain. It anneals with a uniform thoroughness unmatched by any other method. *It exposes 400 times more area to heating than conventional coil furnaces* and delivers greater tonnages than modern day continuous furnaces. Its operating costs per ton are much less.

The Lee Wilson Opened Coil Annealer is the result of 25 years of annealing furnace development in which Wilson engineers have played leading roles. It is a thoroughly tested system about which we're sure progressive annealing engineers will want to know more. To do so, contact a Lee Wilson sales engineer soon.

2343

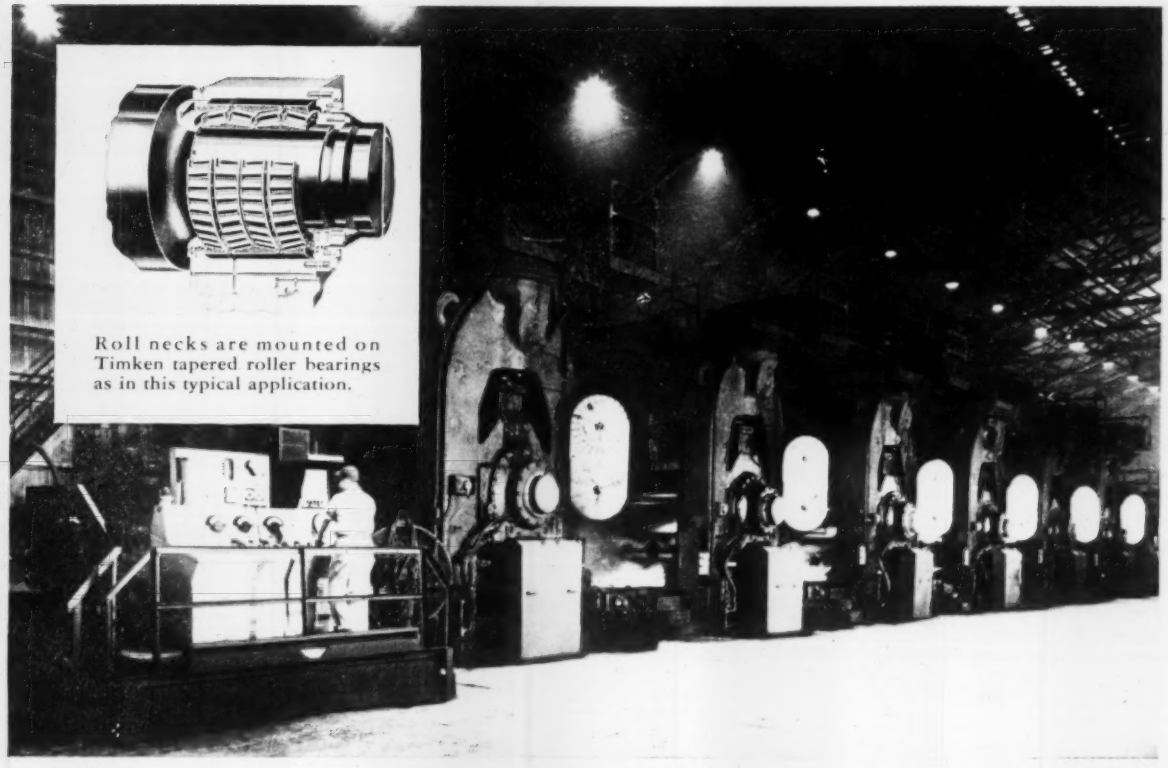
Lee Wilson* ENGINEERING COMPANY, INC.

20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

SINGLE-STACK RADIANT TUBE ANNEALING FURNACES

*MAKE THE BEST METALS BETTER*

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE-STACK RADIANT TUBE FURNACES



Roll necks are mounted on Timken tapered roller bearings as in this typical application.

# New design TIMKEN® work roll bearings average 75% more tonnage than previous design on hot strip mill

TO take the loads of high speed production and reduce mill delays, a Midwestern steel mill installed a new design of Timken® bearings on the work rolls of its 4-high 80" continuous hot strip mill. By the end of 1955, production figures revealed that the new design Timken bearings averaged 75% more tonnage in the fixed position—where service is most severe. This increased tonnage came from increased radial and thrust capacity in these new bearings. The net result was a substantial reduction in bearing cost. And this new design made higher performance possible with no increase in space. It's another example of how Timken Company engineering can help cut costs and reduce mill delays.

These new design Timken work roll bearings are compiling amazing records because 1) Timken advanced engineering designed these bearings for the job. 2) They were precision-manufactured for longer life. 3) Their true rolling motion, made possible by the tapered design and smooth surface finish, practically eliminates friction. Performance records compiled by mill operators everywhere prove Timken work roll bearings provide minimum cost per ton of steel rolled.

So, to minimize mill downtime with correspondingly lower operating costs, be sure you specify Timken tapered roller bearings in the mill equipment you build or operate. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

*This symbol on a product means its bearings are the best.*

TIMKEN

TAPERED ROLLER BEARINGS ROLL THE LOAD